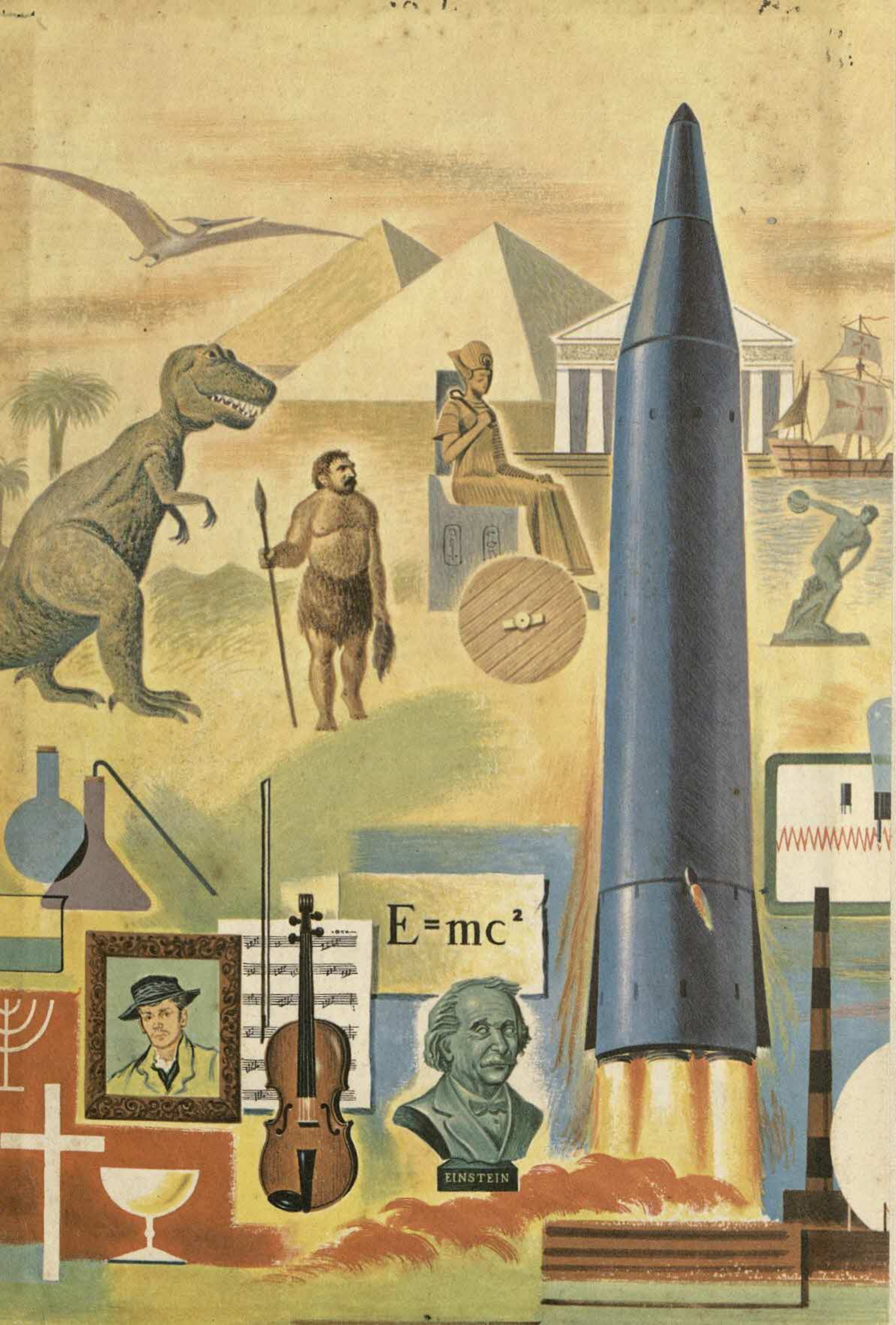
THE WONDERLAND
OF KNOWLEDGE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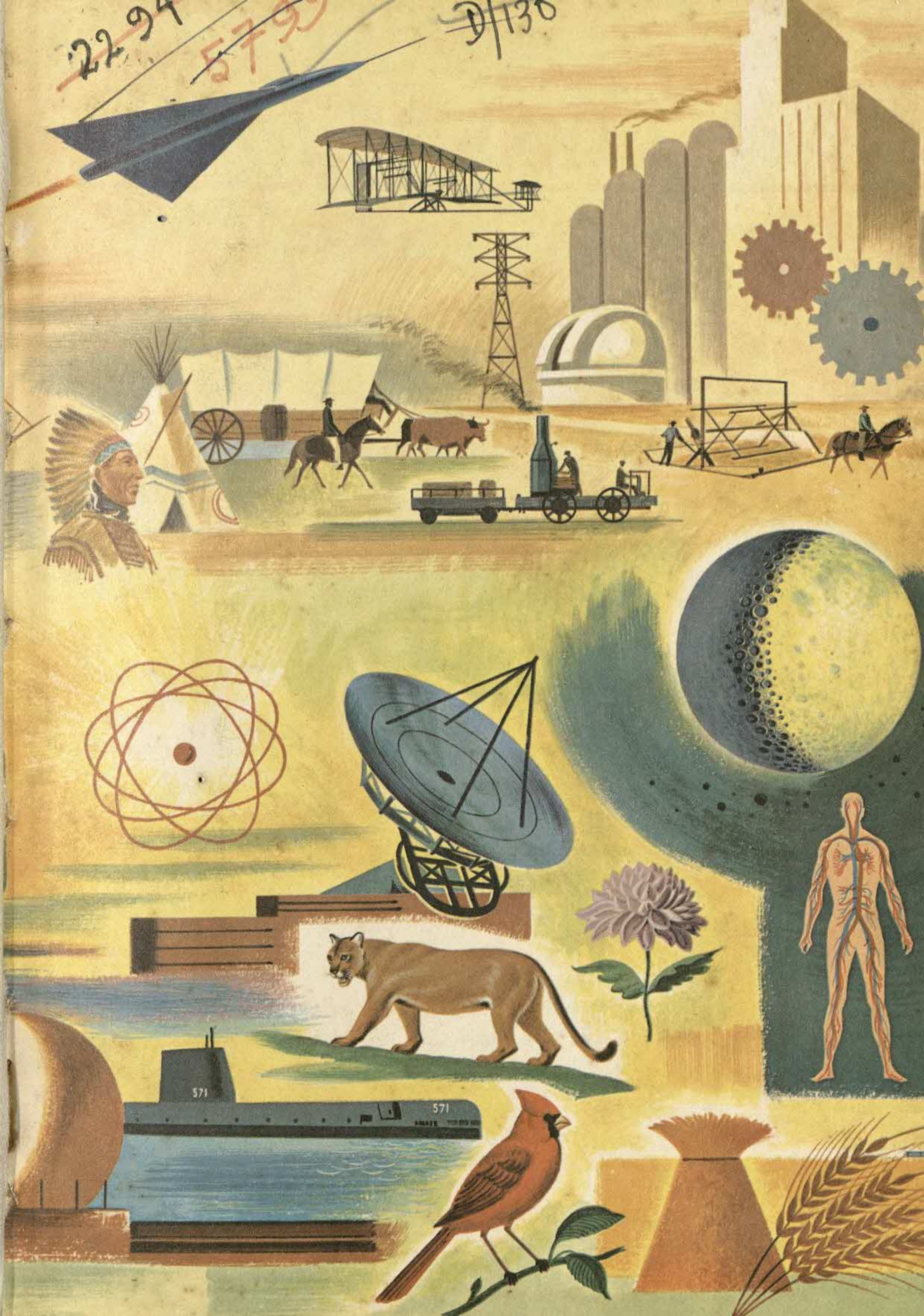

THE WONDERLAND OF KNOWLEDGE

SENIOR … COLLEGE
BALIPUR.

The Pictorial Encyclopedia

1961

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PRONUNCIATION

The pronunciation of titles is indicated by accenting the word or by respelling it phonetically in italics. In the phonetic spelling, letters are used to indicate the sounds which they most commonly represent.

A vowel is *short* when followed by a consonant in the same syllable, unless the syllable ends in silent *e*.

A vowel is *long* when the letter occurs in a syllable which ends in silent *e* or when ending an accented syllable.

The hard sound of *c* is represented by *k*.

The hard sound of *s* is represented by *z*.

The foreign sounds which have no equivalent in the English language are represented as follows:

N for the French *n*, as in Breton: (**Breton,** *bre toN'*).

ö for the German *ö*, as in Göttingen: (**Göttingen,** *gö' ting en*).

ü for the German *ü*, as in Blücher: (**Blücher,** *blük'ur*).

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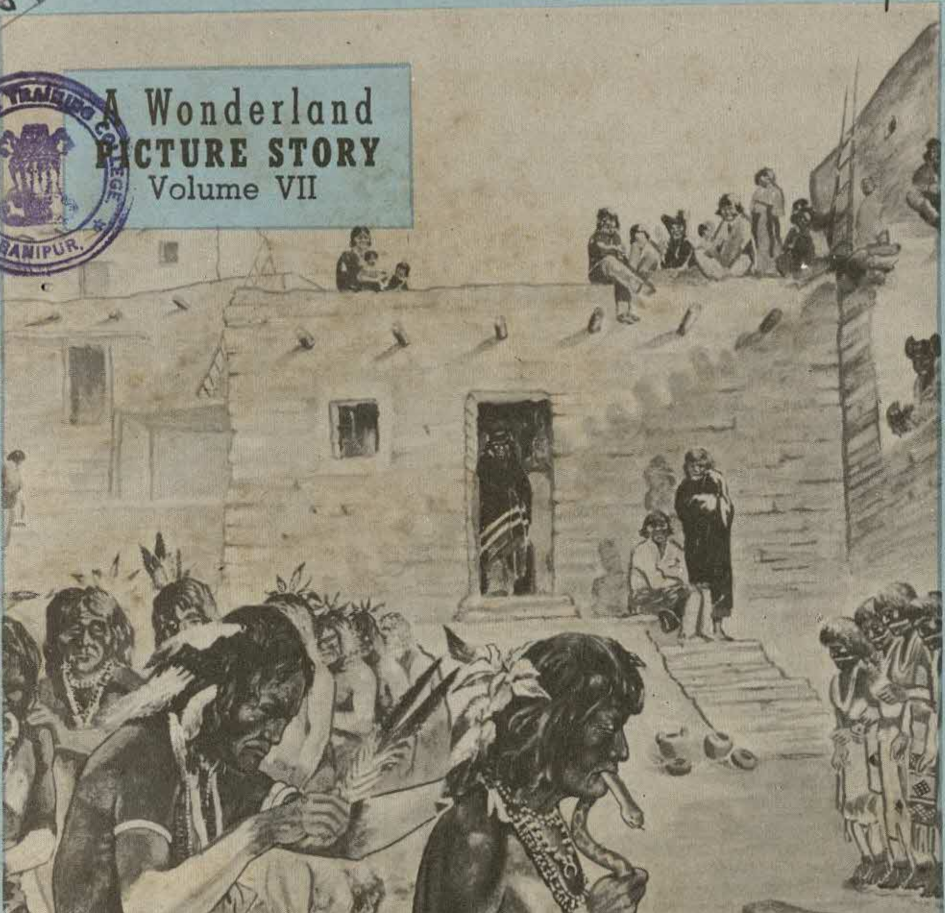
Volume VII



Beloit College News Service

HOPI. One of the most picturesque ceremonies of the Hopi Indians of northeast Arizona is the Snake Dance, which is held in odd years at the pueblo of Walpi. See page 1906.

Exploring the *Wonderland of Knowledge*

In Historic Old Yorktown

What makes safety glass safe?

The shatterproof glass used in automobile windows is made by suddenly cooling sheets of hot glass with a blast of air. This causes the outside layers of glass to contract, compressing the material. When this glass is struck, it collapses into minute particles instead of splinters, thus reducing the danger of cuts and injuries. Another method of making safety glass is to cement two sheets together with a transparent plastic. See GLASS.

What single invention was most important in launching the Renaissance?

Early in the fifteenth century, Johannes Gutenberg, a German, invented the process of printing with movable type. This made possible the universal distribution of written knowledge which was behind the "rebirth" of culture. See GUTENBERG, JOHANNES.

Why is a gyro-compass more efficient than a magnetic compass?

The trouble with magnetic compasses is that iron and steel near by can make them incorrect. Metals do not distract the gyro-compass from duty. See GYRO-COMPASS.

What was strange about Benjamin Harrison's election to the Presidency?

The total popular vote favored Grover Cleveland by nearly 100,000 votes. But because the electoral-college vote is cast according to majority votes by states, Harrison was elected as a result of the votes from the populous state of New York. See HARRISON, BENJAMIN.

What did President Hayes do toward unifying the South and North?

Much to the relief of war-wrecked Southern states, Hayes returned them to self-government as soon as he was elected, thus ending the reign of the "carpetbaggers" and removing a tremendous obstacle to recovery from the war between the states. See HAYES, RUTHERFORD B.

What is the normal temperature of the human body?

The process of keeping alive keeps most of us at a temperature of 98.6 degrees Fahrenheit. If the body temperature varies by as much as one degree, it may be the body is fighting disease, and a variation of more than ten degrees is usually fatal. See HEAT.

Why was strong-man Hercules required to perform the celebrated twelve labors?

Because a jealous goddess made him insane, Hercules murdered his wife and children. The twelve labors were ordered as penance for the crime. See HERCULES.

What do maritime authorities mean by the term "on the high seas"?

By international agreement, a nation with ocean boundaries has jurisdiction to a distance of three miles from its coasts. From that line on, the ocean waters are the "high seas" and ships or planes of all nations theoretically have equal rights and obligations in times of peace. See HIGH SEAS.

What are the highest mountains in the world?

The highest mountain peaks on earth are to be found in the Himalayas, the two parallel mountain ranges that stretch for 1,500 miles along the northern boundary of India. Here is Mount Everest, highest measured peak, rising to a summit 29,028 feet above sea level. See HIMALAYA.

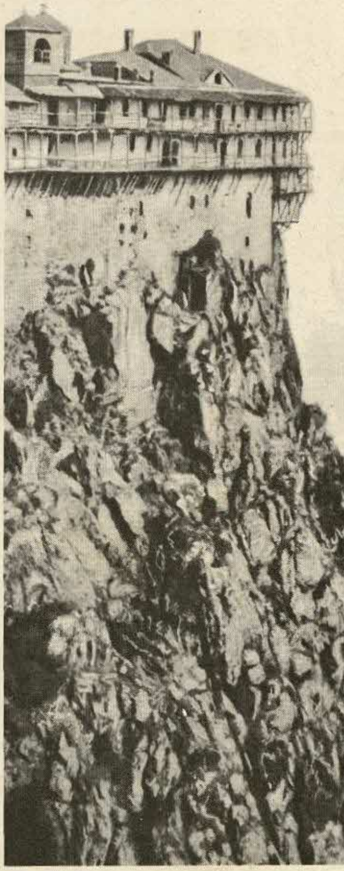
When does the traveler lose a whole day on his journey?

On a voyage from Seattle to Shanghai, the tourist's ship crosses the International Date Line. No matter what time of day it is, today will be tomorrow, by the calendar, the minute he crosses this line. See INTERNATIONAL DATE LINE.

To what influence is the nobility of ancient Greek architecture, sculpture, music, drama, and literature often ascribed?

The activities of the Greeks in classic times were dedicated to the Greek gods. Temples and their ornaments, plays, poetry, even the famous athletic games, were motivated by intense religious feeling, and the splendor of these public achievements contrasted strangely with the private and domestic surroundings of the people. See GREECE.

TRAINING COLLEGE



Top, main buildings of the University of Athens, with Mt. Lycabettus in the background. Left, Greek olive pickers. As in ancient times, the cultivation of olive groves is a leading way to earn a living. Right, a monastery on Mt. Athos, clinging to its cliff above the Aegean. From medieval times this holy mountain has sheltered communities of monks and their rich treasures of Byzantine art and documents.

GREECE—*Mother of* CULTURE

GREECE. If it is true that we are the heirs to "all our yesterdays," then ancient Greece was the richest of our ancestors. For she was the mother of science, of literature, and the arts. She was the founder of democracy and of colonization. She invented athletics, furthered man's knowledge of the soil, of the sea, of life, and of man himself.

Greece Today. The bequests of Greece to the world are immortal, but, like other countries, Greece was only mortal in government. Today she is a small country at the foot of the Balkan peninsula, involved in the bickerings of politics, poor and illiterate, living in the shadows of mounts Olympus and Parnassus where once the gods and Muses were supposed to reside. Her 51,246 square miles of rugged land barely support her 8,000,000 people, and little wealth comes from the crops and minerals taken from the thin soil.

Greece is not confined to the mainland, which is cut up into 2,500 miles of coast line by innumerable bays and inlets. Many little islands, some with a culture older than that of Athens, belong to Greece. All the land is the same, however, holding such varied minerals as iron, lead, nickel, magnesite, lignite, zinc, and the beautiful white marble so well known in the temples and statues. The chief agricultural products are wheat, currants (seedless grapes), oats, maize, barley, olives, tobacco, grapes, lemons, oranges, and figs.

Greece has no coal, but hydroelectric

projects are increasing industrial development. Products include olive oil, spirits, flour, cigarettes, building materials, chemicals, leather goods, textiles, carpets, and ships. Greeks own a greater amount of ship tonnage than all other countries except Great Britain and the United States. Many of these ships, at the choice of their owners, fly flags of other nations. Tobacco, currants, and raisins are the largest exports. Major customers are West Germany, the United States, and France. Rail, sea, and air routes link Greece to most of the major centers of Europe.

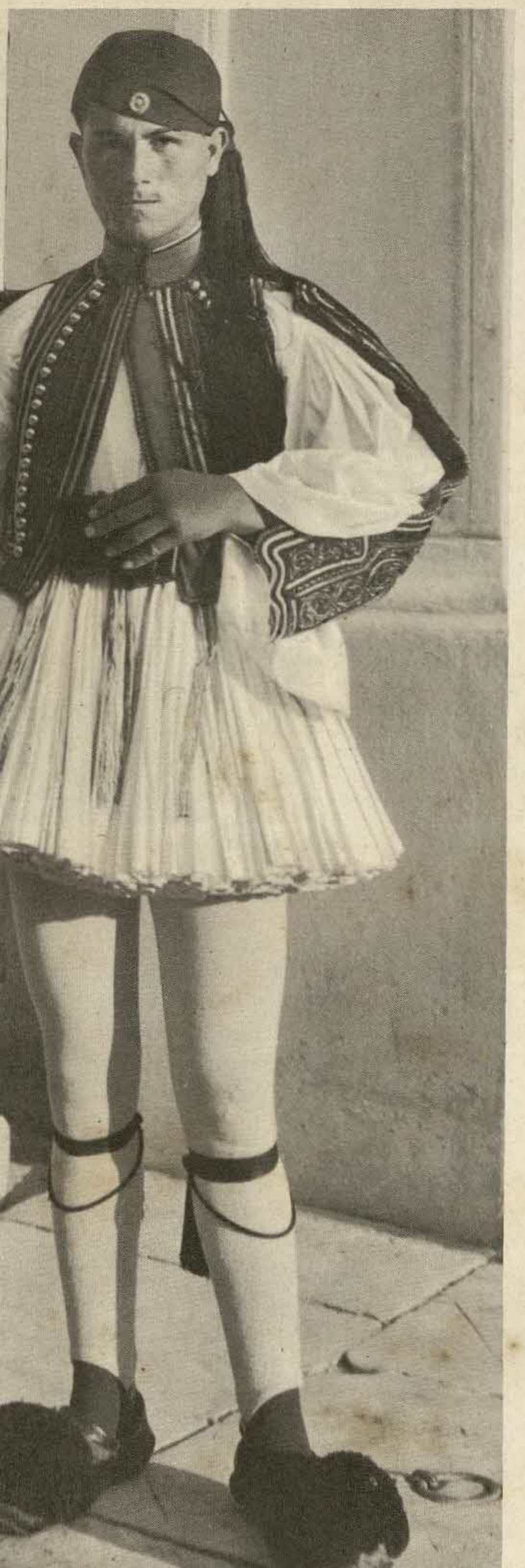
Education is compulsory from six through fourteen. There are six college-level institutions at Athens and one at Salonika. Nine-tenths of the people believe in the Greek Catholic faith, but freedom of religion is guaranteed to all. The language is very similar to that spoken in Greece thousands of years ago.

Peasant life in Greece resembles that of the Balkan countries. Dark clothing is worn for every day, but on festive occasions the people like to put on the gay and varied traditional costumes of their locality—embroidered dresses and aprons for the women, short skirts and long hose for the men.

The government is a monarchy. The king ruled in exile from 1941 to 1944, when the government was reestablished under a regent; the monarchy was restored two years later.

Greece Yesterday. The history of Greece is a story of troubled and stormy politics, of internal and foreign wars. In ancient days, such wars served to stimulate the work of architects, sculptors, writers, philosophers, dramatists, orators, and lawgivers. Later, they reduced Greece to a second-rate power; but by that time, her work was finished, and Greek civilization was spread throughout Europe.

Religion was the dominant factor in the life of a Greek. On the highest hill in his



Galloway

GUARD AT ROYAL PALACE, ATHENS

Short white skirt, turned-up shoes, embroidered vest, and tasselled cap mark the costume of the *evzone*, who stands motionless at his post, even when not being photographed.

From one of a series of oil paintings, "A History of Pharmacy in Pictures," commissioned by and copyrighted by Parke, Davis & Co.; reproduced by special permission. George A. Bender, project engineer; Robert A. Thom, artist.

AN INFORMAL EDUCATION IN ANCIENT GREECE

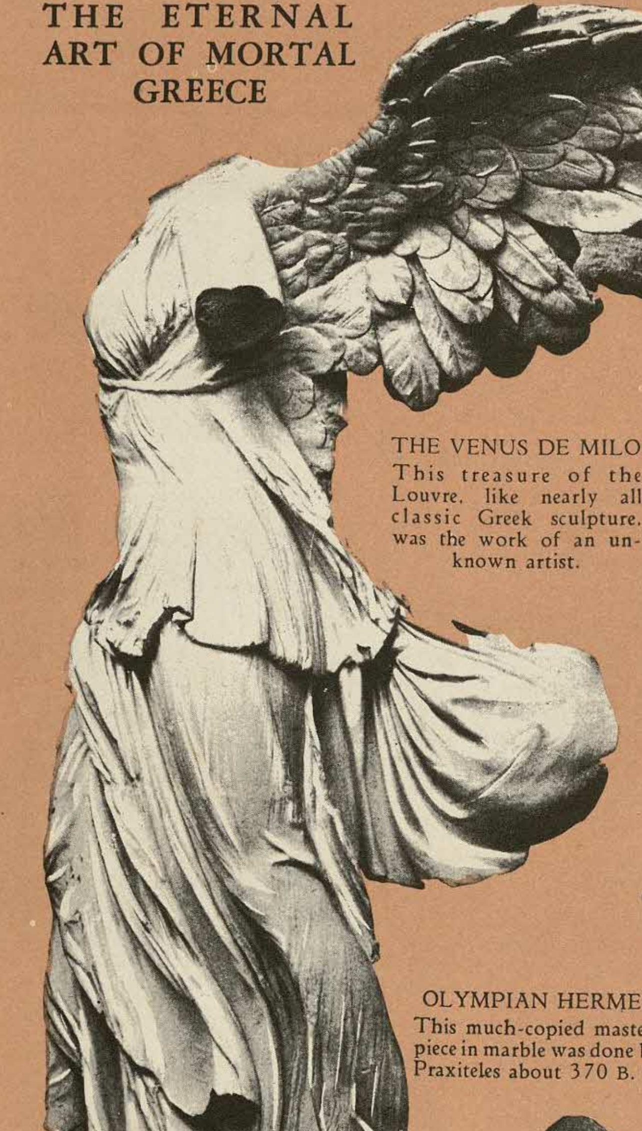
Few people attended school but some heard lectures by great teachers such as Theophrastus, the father of botany, above. Informal groups walked with him, learning of nature by firsthand observations.

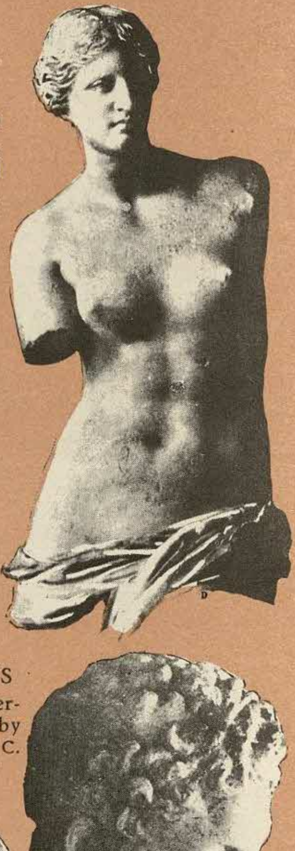
city, he built a small, perfectly designed and constructed temple. Around it he placed other temples with statues and beautiful columns, but he was content to live in a small wooden or mud house. His activities were dedicated to the gods. If he were an athlete, he took part in the Olympics or other games in a ritual that had religious significance. His dramas were played in celebration of Dionysus, god of wine, and his art depicted gods, goddesses, or events involving mortals.

The theater, particularly, had its origins in religion. Dionysus was supposed to live in a vineyard, surrounded by satyrs who were half goat and half man. Processions were held in his honor in which those taking part wore goatskins. Since the word *tragos* means *goat* in Greek, and *oidos* means *singer,* the persons who wore these skins and made sounds like goats were called *tragos-oidos,* which later became our word for *tragedy.*

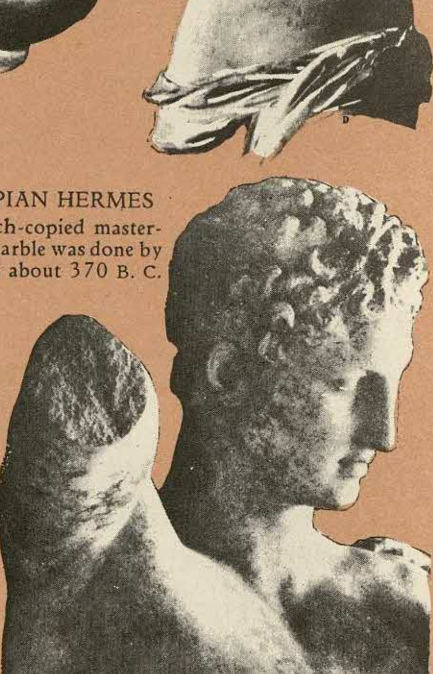
As time went on, the people who took part in the processions became known as the chorus; and, to make things more interesting, it was decided at one festival to have one of the members come forth and engage in dialogue with the leader. This idea proved so popular that it was adopted at succeeding festivals. Then Aeschylus, a great writer of tragedy, introduced two

THE ETERNAL ART OF MORTAL GREECE





THE VENUS DE MILO
This treasure of the Louvre, like nearly all classic Greek sculpture, was the work of an unknown artist.



OLYMPIAN HERMES
This much-copied masterpiece in marble was done by Praxiteles about 370 B. C.

THE WINGED VICTORY OF SAMOTHRACE
Another Golden-Age masterpiece by an unknown hand, incomparably beautiful even in ruins.

THE ACROPOLIS OF ATHENS

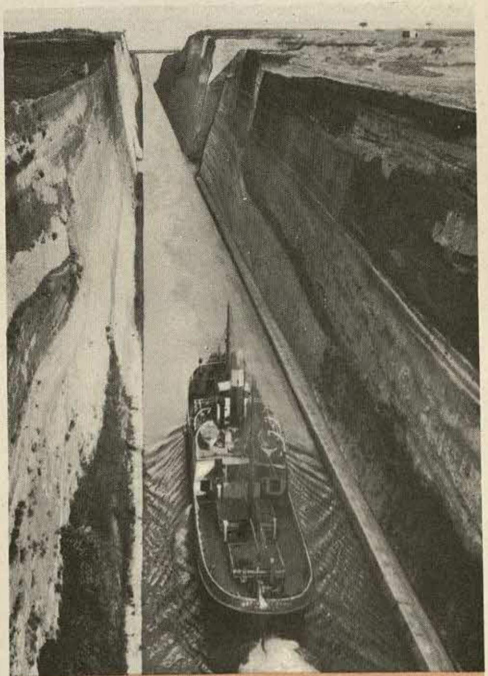
Once the center of the world's art and culture, the Acropolis, crowned by the Parthenon, is beautiful even in decay. At the foot of the hill is the Odeum, or colonnaded music theater, built in Roman times by Herodes Atticus.

characters, called actors, and the pageant became more serious. Later, Sophocles added another character, and then, Euripides, many. Theaters were built throughout the peninsula and the drama became a part of Greek life.

Whatever the Greeks did was in moderation. This was evident in their home lives as well as in artistic enterprises. All unnecessary ceremony and decoration were omitted. Meals were small but wholesome; clothing and buildings were simple. Athens turned her energy to art, literature, the theater, and science. Sparta, her great rival, turned to building a powerful army, and her citizens did little to advance the literary or artistic attainments of the other Greeks.

It was by taking advantage of slavery that the Greeks had time to take such an interested part in public affairs, to go to the theater or gymnasium, to partake in athletic events, to make wars, to write books, to carve statues, and to study the stars. The slaves did the housework, tilled the soil, carried on the routine trade and business, and quarried the marble. They were the workmen who put the stones of the Parthenon in place and built the houses. Had there been no slavery, the Greeks would probably not have had the unsurpassed civilization the world admires.

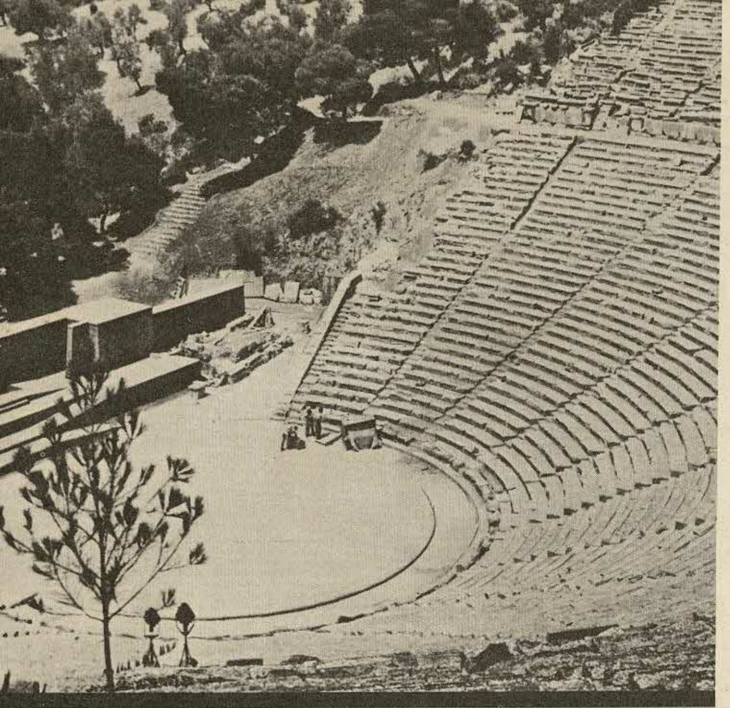
Because the government of the Greeks

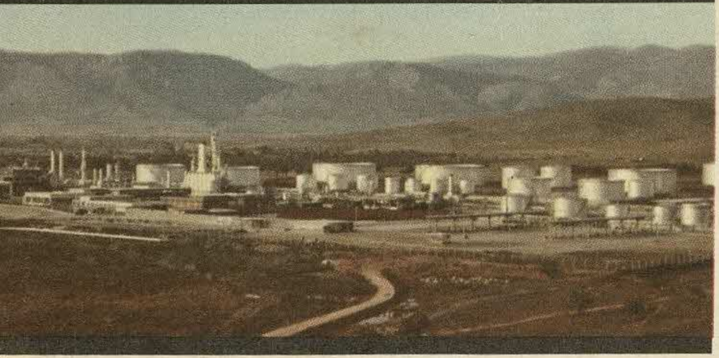


Galloway

CANAL CUTS ISTHMUS OF CORINTH

This canal, which separates the Peloponnesus from central Greece, is about four miles long. Nero started it. It connects the Saronic Gulf and the Gulf of Corinth. Ancient Corinth, where St. Paul preached, is near by. Ships sunk by the Germans blocked the canal during World War II.





Greece Combines Ancient Ways With Modern Arts of Living

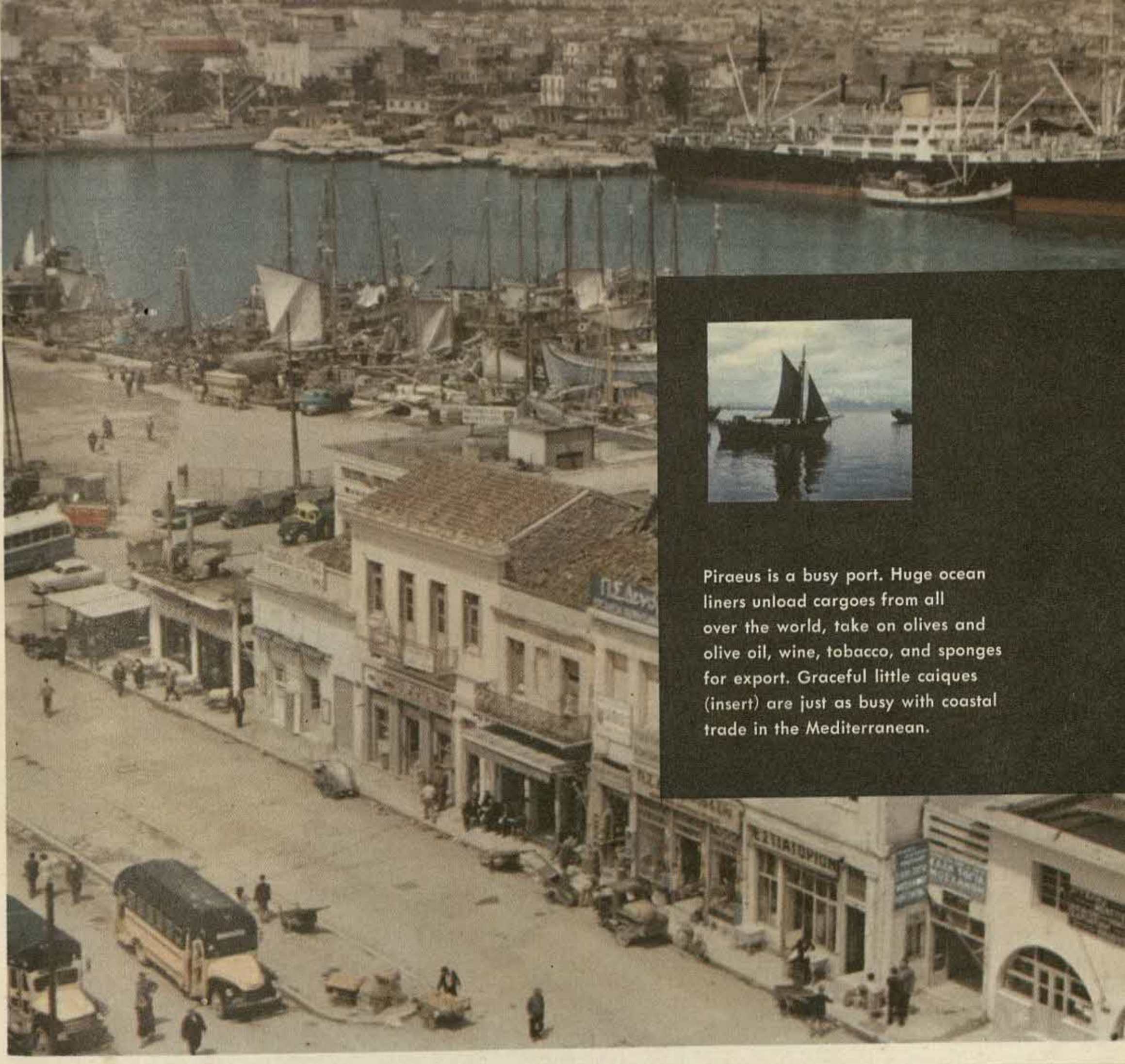
There is room for the past in today's living in Greece. The theater at Epidaurus has been used since prehistoric times. Centuries ago, the town of Epidaurus was famous as a health resort, and people came for healing, rest, and entertainment. The theater is still popular. Revivals of old Greek dramas are staged every year—complete with modern lighting and a piano accompaniment. Petroleum, called *Greek fire* by the ancients, was dreaded as a flaming weapon. Today, petroleum is processed in huge refineries like this one for up-to-the-minute transportation. Trucks and cars hum along a road carved around Mount Olympus, once sacred to Zeus and the other Greek gods.

Socony Mobil Oil Company, Inc.

was centered in the city states, the people never thought of themselves as a nation. Their loyalty was to the city in which they were born and lived, or to the city which owned their colony. Thus men proudly called themselves Athenians or Spartans or Thebans, referring to themselves as Greeks only when they were temporarily banded together to war against a common enemy. But in each city state, when a tyrant did not seize control, the government was one in which all the freemen had a voice. Meetings were held in the market places to decide important questions; everyone could give his opinion, and officials were popularly elected. This form of pure democracy was unknown before in history.

During the Hellenistic period of Greece, the time after Alexander's death, a different atmosphere pervaded the Greek cities. They were no longer independent of one another, but were parts of an empire. The conquests of Alexander had spread Greek culture but at the same time had infused the Greeks with an Oriental touch that was shown in the architecture and sculpture of the time. It was less perfect than in the days of Pericles, for the spirit of moderation that had characterized art then was now missing. However, this age was responsible for a great advance in science, and was the age that influenced Roman culture.

The History of a People. According to the best information, the Greeks were of Indo-European origin and came from the



Piraeus is a busy port. Huge ocean liners unload cargoes from all over the world, take on olives and olive oil, wine, tobacco, and sponges for export. Graceful little caiques (insert) are just as busy with coastal trade in the Mediterranean.

New Farm Methods Grow More Crops on Old Land

More than half the people in Greece live on farms. They realize it takes modern methods to produce good crops on their centuries-old soil. They learn how at the American Farm School, known all over Greece for its progressive farming classes. Villagers come from every part of the country, return to teach others how to handle the latest equipment and to build better farms.

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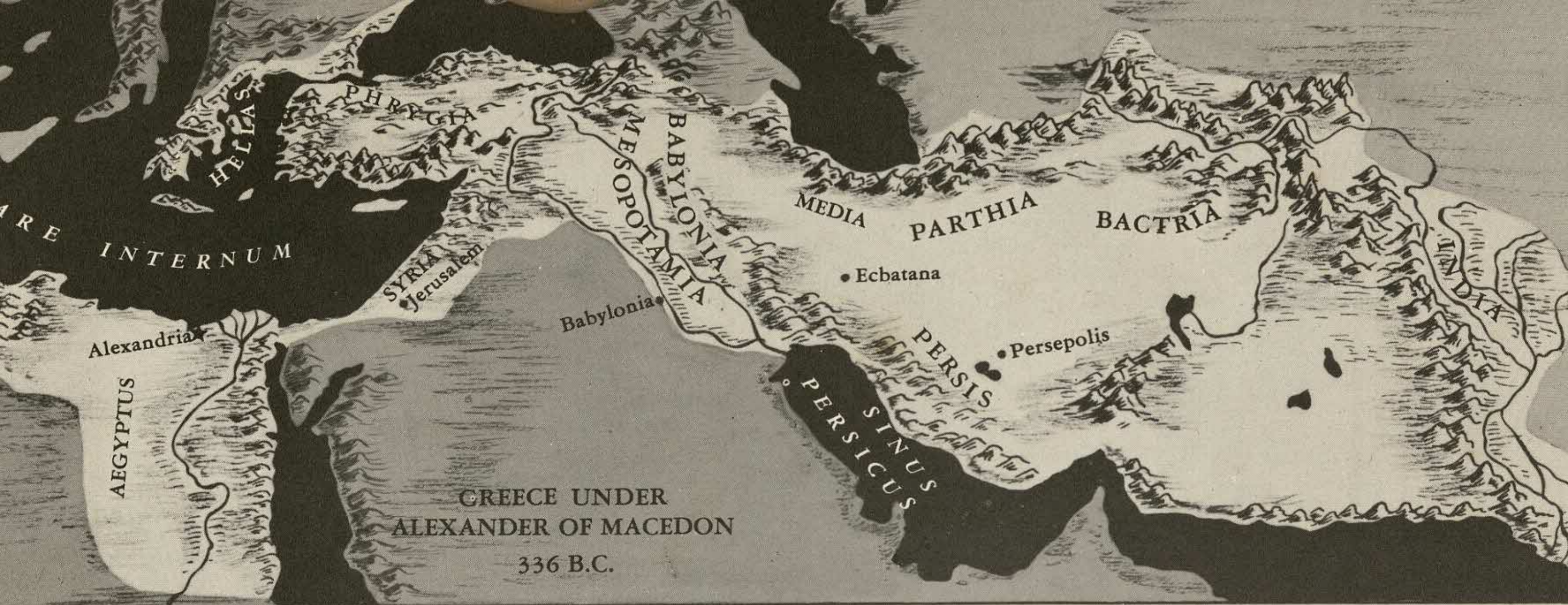
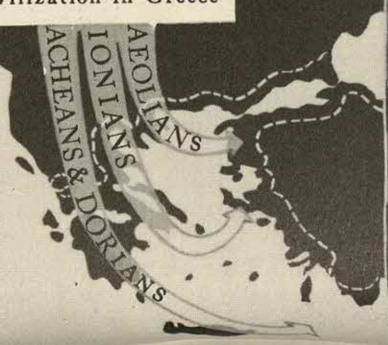
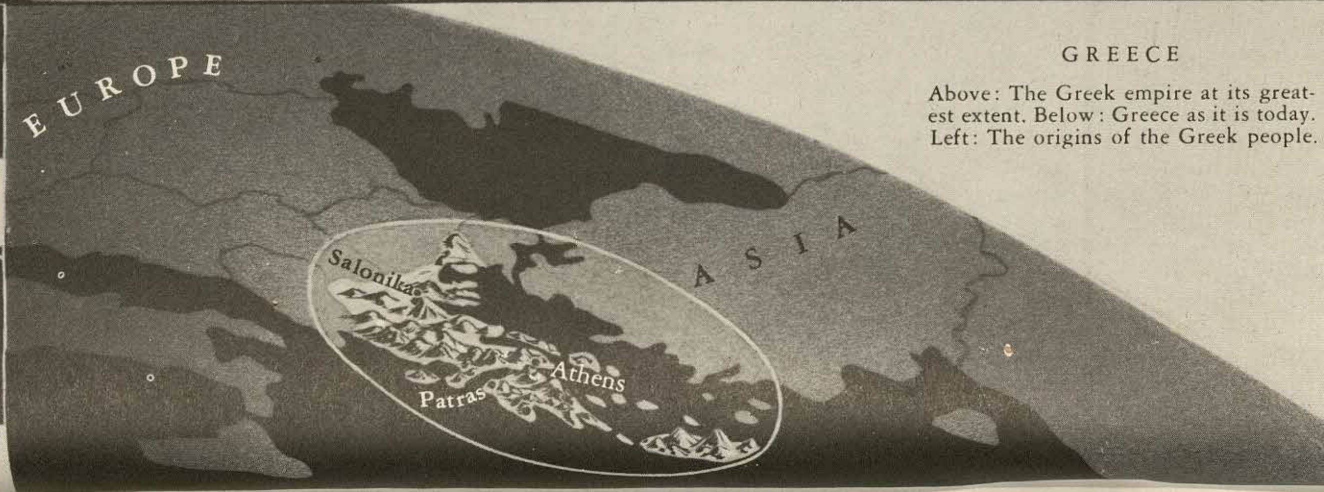


vasion routes of the do-European peoples ho came down from e north to form a new vilization in Greece





GREECE

Above: The Greek empire at its greatest extent. Below: Greece as it is today. Left: The origins of the Greek people.

region of the Black Sea to the Aegean Sea. That was about 2000 B.C. They settled on the coasts of Asia Minor and on the peninsula extending south from Europe. Apparently these people conquered the earlier, cultured people who already inhabited the land. ¶There already existed a civilization that was nearly as old as that of the Egyptians and Babylonians. Archaeologists have uncovered pottery, statues, and bronze implements of great antiquity, and they have found ancient writings that prove the ancestry of the Greeks.

About 1500 B.C., a warlike people known as the Dorians invaded the Peloponnesus, the southern part of the Greek mainland that is almost an island. They conquered a considerable portion of Greece and they completely dominated the people they found there. Their system of government was based on the tribal system. The individual did not count and there were no organized laws. As men began to possess property, certain individuals became powerful and an aristocracy began to grow up. However, in Sparta, one of the major settlements on the Peloponnesus, the tribal customs continued and had a great influence on the city state which developed in various parts of the peninsula.

It must be remembered that ancient Greece was never one united nation. It consisted of a group of cities, each with its own independent government. Frequently these city states banded together for protection or other reasons, but they were never united under one government. The tribal chiefs became the kings of most of the city states but the powers of the rulers became less as councils were formed. Between the years 1200 and 700 B.C., the principal Greek city states were Miletus in Asia Minor, and Eretria and Chalcis in Greece proper.

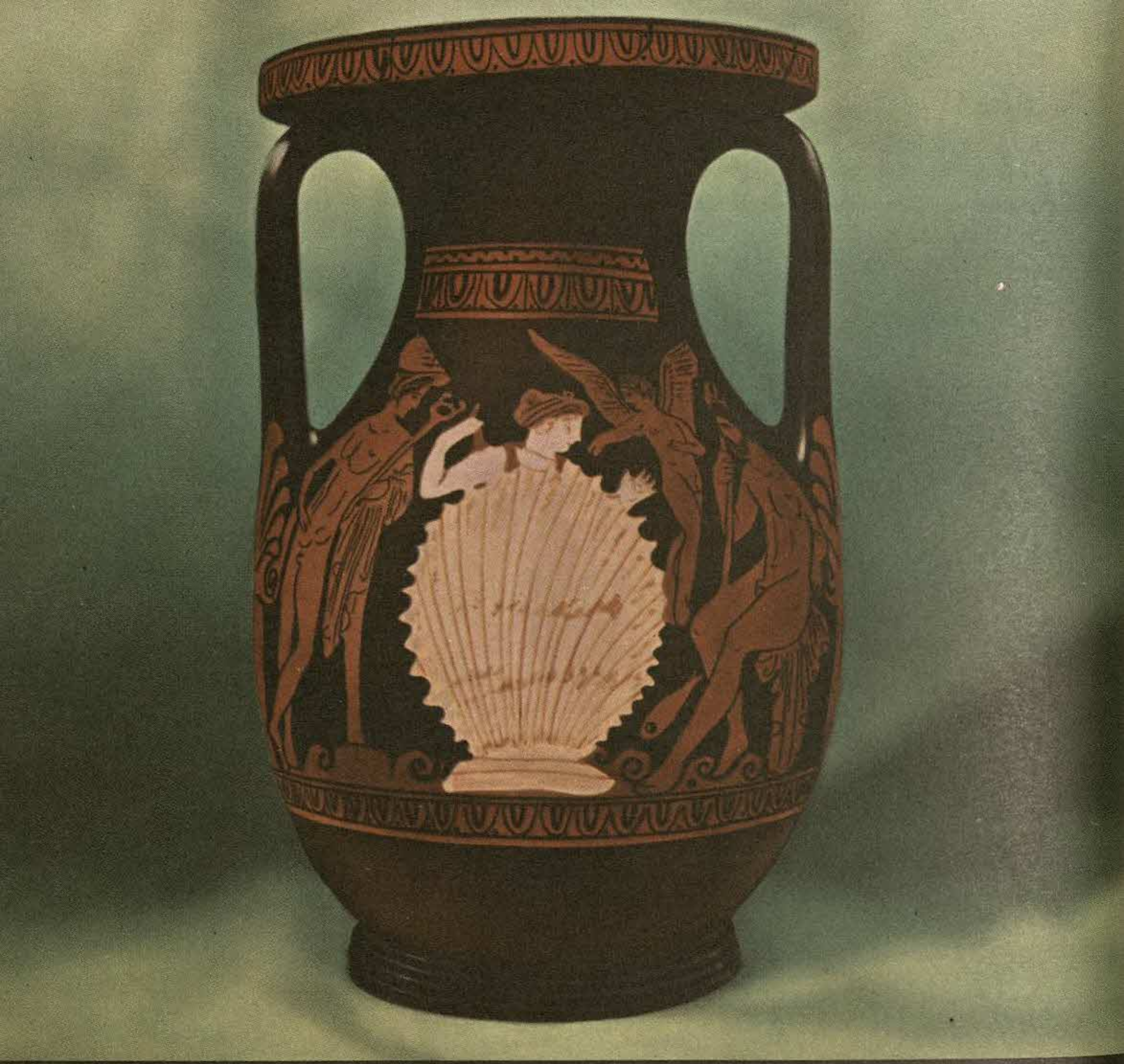
At intervals, overpopulation became a problem in Greece. To overcome this problem, the early Greeks devised the system of founding colonies for trading purposes. Many of them exist as modern cities of our times. Among them were Syracuse in Sicily; Tarentum in Italy; Corcyra in the Adriatic; Massilia in Gaul; Cyrene in Africa; and Byzantium on the Bosporus. Sparta, however, chose to solve its problems through conquest and in the eight and ninth centuries B.C. was rapidly becoming a great military power. The other city states then formed protective leagues to defend themselves.

From 700 to 500 B.C., trade and commerce provoked the overthrow of the autocratic governments, and democracies began to develop. The Ionian cities in Asia Minor served as contacts with the trade from the Orient and stimulated commerce. In order to trade, the city states formed leagues, which resulted in frequent quarrels. A middle class trading group grew up and demanded rights. Men began to think that they were entitled to certain privileges as individuals, and laws came into effect. Some of the most noted lawgivers of these times were Solon of Athens and Lycurgus of Sparta. Even in the English language of today we use the term *solon* to indicate a legislator or a wise man. Through the laws the people overthrew the autocratic governments, but for some it became an era of tyrannies when powerful men called tyrants seized the rule of the city states.

Athens did not become the dominant power in Greece until the fifth century B.C. when the Persians were defeated. The attempts of the Persians to conquer Greece in this century had an important bearing on the future of Greece and upon the entire world. The Persians had seized the Ionian cities; and, when these cities attempted to revolt in 499 B.C., the Athenians sent ships to assist them.

At first the revolt was successful, but later was put down by Darius, the Persian king. Mardonius, son-in-law of Darius, was sent to destroy Athens in 492 B.C., but a severe storm wrecked his ships at sea, and the army met stubborn resistance on land. Two years later, however, another force was sent; and, in one of the decisive battles of the world, the Athenians defeated the Persians at Marathon in 490 B.C.

Through this victory Athens became the leader of Greece and began the amazing

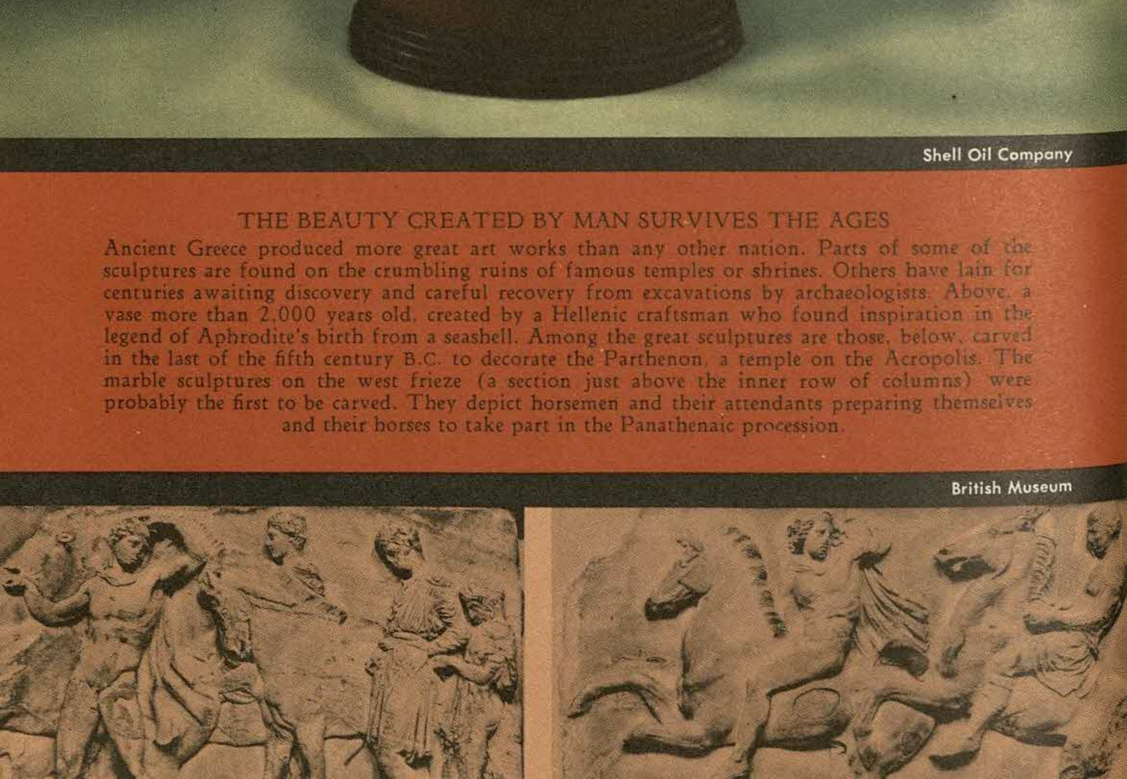


Shell Oil Company

THE BEAUTY CREATED BY MAN SURVIVES THE AGES

Ancient Greece produced more great art works than any other nation. Parts of some of the sculptures are found on the crumbling ruins of famous temples or shrines. Others have lain for centuries awaiting discovery and careful recovery from excavations by archaeologists. Above, a vase more than 2,000 years old, created by a Hellenic craftsman who found inspiration in the legend of Aphrodite's birth from a seashell. Among the great sculptures are those, below, carved in the last of the fifth century B.C. to decorate the Parthenon, a temple on the Acropolis. The marble sculptures on the west frieze (a section just above the inner row of columns) were probably the first to be carved. They depict horsemen and their attendants preparing themselves and their horses to take part in the Panathenaic procession.

British Museum



cultural career that was to reach its height some years later.

The Athenians, however, knew that the Persians would attack again and, under the leadership of Themistocles, built more ships. They were right, for in 480 B. C. Darius' son, Xerxes, amassed a huge army, crossed the Hellespont, and marched into Greece. Knowing they could not oppose such a formidable force alone, the Athenians and Spartans called a meeting of delegates of all Greek city states. Not all responded or wished to take part, but those that did adopted Themistocles' plan of avoiding a land battle and engaging the Persians on the sea.

However, the Persian army had to be checked, so a Spartan force was sent to Thermopylae. There, defending the pass, occurred the tragic but brave battle in which every Spartan guarding the narrow pass was killed. On the sea, however, the Athenian navy destroyed the Persian ships at Salamis, and the Persians were finally driven from Greek territory for all time.

The victory of the Greeks through co-operation should have taught them the benefits of unity. It did not, however; and although there was a half century of peace after the Persian wars, the confederation fell apart, and each city state returned to its former status. Sparta continued to develop its military power, while Athens, now in its Golden Age of literature, sculpture, and architecture, under Pericles, became the cultural center. Athens also built colonies and engaged in trade during this time, increasing her sea power.

Sparta grew jealous, and finally in 431 B. C., the Peloponnesian War between Athens and Sparta broke out. Sparta sought to invade Attica, the territory of Athens, and cause her allies to rebel. Pericles, leader of Athens, depending on his strong navy, counteracted this attempt by ravaging the coast of the Peloponnesus and destroying the trade of the cities there. Athens was winning until a terrible plague wiped out one fourth of its population; Pericles died, and in 421 B. C. a fifty-year peace was agreed on between Athens and Sparta. But before long, another Peloponnesian War broke out, which lasted until 404 B. C., when the power of Athens was broken.

Sparta, the war power, was dominant in Greece for thirty-five years after the struggle, but her rule was so tyrannical that a revolt took place under the leadership of Thebes. The Spartan army was finally defeated, and Thebes came to power. Ten years later, Sparta and Athens joined forces to overthrow her rule. Greece was by this time in confusion. Wars had impoverished the city states, and there was no governing force. To the north, in Macedonia, a strong and powerful king, Philip, saw his opportunity and began a war of conquest in Greece.

The powerless city states fell before him; and despite the oratory of Demosthenes, the Athenians and Thebans were unable to muster a force strong enough to defeat him, being conquered in 338 B. C. Although Philip was now master of all Greece, he was wise enough to recognize that the Greek people were far more learned than his own; and, under his son, Alexander the Great, who succeeded him two years later, Greek culture was expanded and encouraged.

When Alexander died, his empire broke up; internal wars took place, and an invasion by the Gauls in 279 B. C. caused great havoc. Rome, in the meanwhile, was becoming powerful; and the disunited Greek city states fell before her legions. With the destruction of Corinth in 146 B. C., Greece became subject to Rome. For a while Greece prospered under Roman rule; then, in 86 B. C., Athens was sacked by Sulla, but its leadership in culture was restored under Augustus. Christianity was readily adopted in Greece later; and, when Constantine ruled, it became the center of the Eastern Roman Empire. In 330 Constantine made Byzantium his capital and renamed it Constantinople.

In the meanwhile, however, Greek influence had permeated Roman life. Roman youths were sent to Greece to be educated.

Greek scholars and philosophers, as well as educated slaves, went to Rome and spread their learning. The teachings of the Greeks were carried wherever the Roman legions conquered, and gradually the influence spread through Europe.

During the Middle Ages, Greece, as the seat of the Byzantine, or Eastern Roman, Empire, was the sole center of learning in Europe; but in 1453 the Turks captured Constantinople, and Greece soon fell under an oppressive and disastrous rule that was not broken until the nineteenth century. The Greeks rebelled against the Turks in 1821, and during the next nine years a fierce struggle raged. Greece was aided by England, France, and Russia and finally, in 1830, was recognized as an independent country for the first time in nearly 2,000 years.

Her troubles were not over, however, for Capo d'Istria had become a dictator; and in 1831 he was assassinated. Otto of Bavaria became king in 1832, and in 1843, the people secured a Constitution. Otto was unpopular, however, and was deposed in 1862. Prince William of Denmark became King George I of Greece, and in 1863 a liberal Constitution was adopted. England ceded the Ionian Islands to Greece in 1864, and in 1881 Thessaly was added.

Crete, which still belonged to Turkey, sought to become a part of Greece in 1897, and a war between Greece and Turkey ensued. It was disastrous for Greece. Through the intervention of Russia, however, she received more territory, although she had to pay an indemnity. After the Balkan War of 1912-13, Greece acquired additional territory, including Crete. King George was assassinated after that war and was succeeded by his son Constantine.

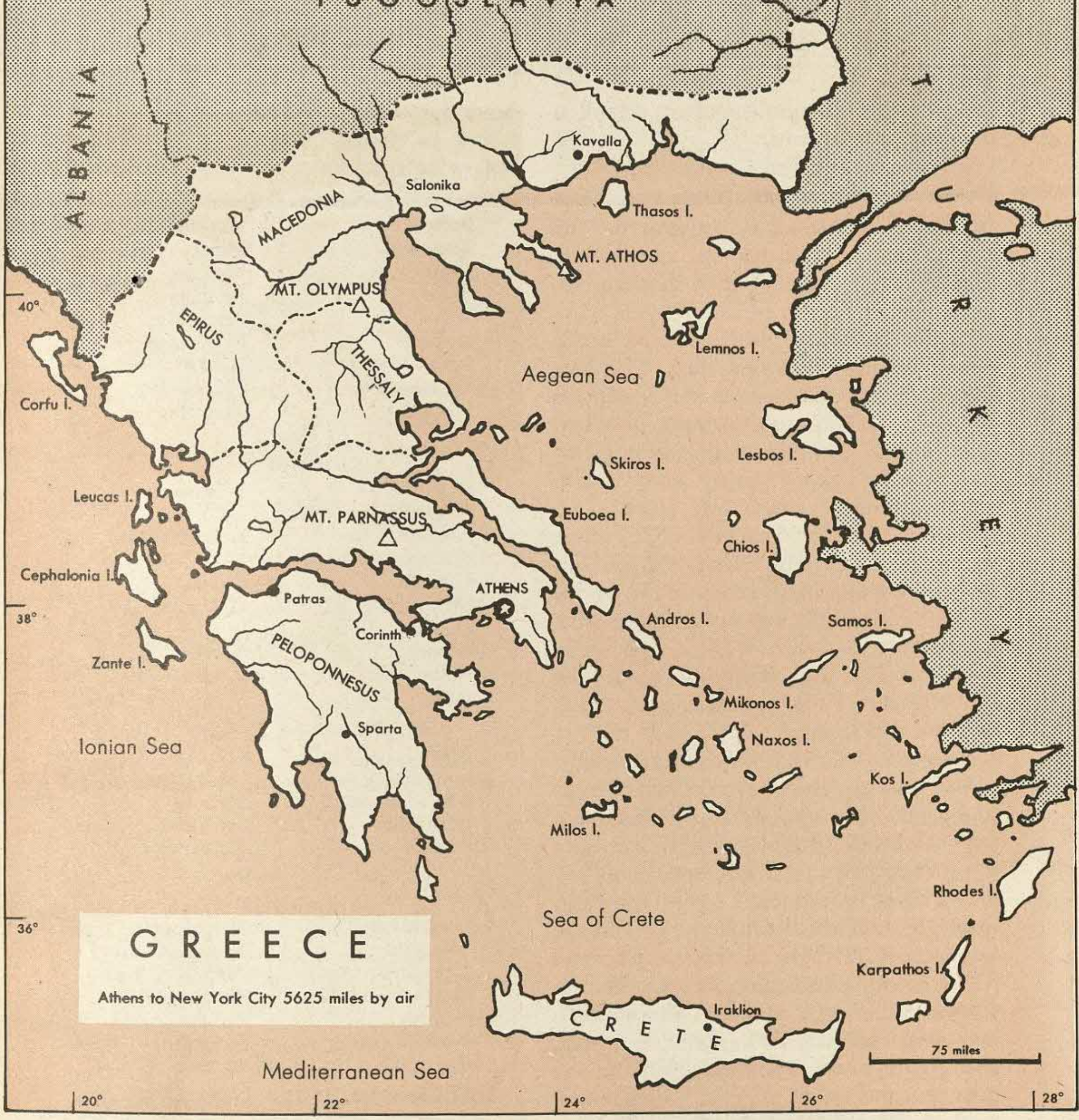
Greece was in an embarrassing situation at the outbreak of World War I. King Constantine's wife, Sophia, was a sister of Kaiser William II of Germany; but Greece had a treaty with Serbia to aid her if she were attacked. Constantine refused to go to Serbia's aid when she was invaded by the Bulgarians, and the pro-Allies group in Greece, under Venizelos, revolted. Constantine was forced to abdicate in 1917 in favor of his son Alexander; and, although he regained the throne in 1920 when Alexander died, he abdicated again in favor of his son, George II, in 1922. George, in turn, was exiled in 1923; and a year later a republic was established.

A SPORTSMAN TURNS HERO

Pheidippides was a famous runner. When the Greeks defeated the Persians at Marathon, he ran to Athens with the news, and dropped dead.

Violent political strife marked the life of the Republic. An unsuccessful rebellion on Crete in 1935 led to the ouster of Premier Tsaldaris and a plebiscite favoring the recall of King George II. A constitutional monarchy was established and one year later the king supported a dictatorship set up by Premier Metaxas.

Greece sought neutrality in World War II but was invaded in 1940 by Italy. The Greeks fought back and ousted the Italians. When German forces massed to attack, Greece allowed British troops to enter the country. The Germans attacked and conquered the Greek mainland and Crete. The Greek government settled in Cairo. Guerrillas hampered German rule but also fought



among themselves. British and Greek forces expelled the Germans in 1944. Three months later leftist guerrillas were fighting the British. Many changes of government took place during this period. In 1946 a plebiscite again recalled George II. The King returned but died shortly afterward and was succeeded by his brother, Paul.

The Communists set up a rival government and this became a subject for argument and criticism in the cold war between East and West. A system of military and economic aid inaugurated by President Truman, and called the Truman Doctrine, did much to help Greece recover from its long period of strife. The Communist party was outlawed and women were given the right to vote and to run for office. In 1953 the first woman was elected to the Chamber of Deputies. With its economy more stable and the political situation considerably calmer after years of hardship, Greece began to enjoy a period of comparative quiet and recovery.

Deathless Gifts of Greece. It is impossible to enumerate all the contributions to civilization made by ancient Greece. However, some of the most important contributions may be told here.

In government, the Greeks devised the system of democracy which had a profound effect on later nations, particularly the United States. The zeal for establishing colonies was a forerunner of modern empires.

Architecture must always go back to the Greeks for models of perfection. The Parthenon on the Acropolis in Athens is still an object of impressive simplicity—often called the world's most perfect example of architectural beauty. Other temples also were masterpieces of building, splendid examples of the use of columns. Sculpture, such as that created by Phidias, Myron, and Praxiteles, is among the finest in the world; it had great influence on artists of the Renaissance and the modern age. The *Venus de Milo* and *Winged Victory,* now in the Louvre, Paris, are exquisite examples of grace and strength.

Homer's *Iliad* and *Odyssey* are unsurpassed among epics. Greek plays, especially in the tragedies of Aeschylus, Sophocles, and Euripides, and the comedies of Aristophanes, are surpassed only by Shakespeare's creations. In geography and history Greece also led the world with the writings of Hecataeus, Herodotus, and Thucydides. Philosophy was another invention of Greece, and her philosophers, including Socrates, Plato, Zeno, Epicurus, and Aristotle, are still ranked among the greatest thinkers of all time. Science and mathematics were given to the Western World by Aristotle, Archimedes, Euclid, and Eratosthenes. Athletics, still another part of our life that was original with the Greeks, taught man how to grow strong and take pride in his body. The modern Olympic Games are modeled after those of ancient Greece. The stadium also originated in Greece.

In addition, the Greeks were among the first to practice scientific methods of tilling the soil; they improved the methods of warfare; and they built large galleys that were the forerunners of later great sailing ships that travel to modern Greece.

For additional information, consult the following articles:

GEOGRAPHY

Athens
Boeotia
Corinth
Crete
Delos
Delphi
Ionian Islands
Macedonia
Marathon
Mars Hill
Melos
Mycenae
Olympia
Parnassus
Peloponnesus
Sparta
Thebes
Thessaly
Thrace

HISTORY

Achaeans
Alexander the Great
Aristides
Byzantine Empire
Darius I
Demosthenes
Dorians
George II
Helots
Ionia
Leonidas
Lycurgus
Lysander
Miltiades
Oracles
Ostracism
Pericles
Solon
Themistocles
World War (I, II)

ART, LITERATURE, PHILOSOPHY

Aristotle
Euripides
Greek Language
Herodotus
Phidias
Plato
Praxiteles
Socrates
Sophocles
Thucydides
Xenophon

UNCLASSIFIED

Academy
Acropolis
Alexandrian Age
Alexandrian Library
Festivals
Isthmian Games
Mysteries
Mythology
Nemean Games
Olympic Games
Parthenon
Pythian Games
Sculpture
Stadium

GREEK CHURCH. The official name of the Greek Church, as it is commonly called, is Holy Orthodox Catholic and Apostolic Church; it is also known as the Eastern Church. Receiving its name from the countries included in the Byzantine Empire, of which Greece was the center, the faith is dominant in Greece and the surrounding countries and among the people of Russia. It is no longer the state religion in Russia, however.

Besides rejecting the authority of the Pope, the Greek Church holds that the Holy Ghost proceeded only from the Father, while the Roman Catholic creed adds "and from the son." However, the seven rites—baptism, confirmation, the Eucharist, penance, extreme unction, holy orders, and matrimony—are held by the Eastern Church in spite of many variations in ritual. Baptism is a triple immersion; confirmation occurs immediately afterward; no images except the cross are allowed. There are a number of fast periods and observances of special days.

Another outstanding difference between Roman and Greek Catholics is that priests and deacons of the Greek Church are allowed to marry before they are ordained. Bishops, however, cannot be married, and are selected from the monasteries.

Since the Greek Church separated from the Roman Catholic in 1054, it has grown to a membership of nearly 150,000,000.

GREEK LANGUAGE. One of the oldest of the spoken languages, Greek has been the language of learning and culture for a longer period of time than any other tongue. Some of the greatest classics of antiquity were written in Greek, as were several books of the Bible.

There are several Greek dialects, which are known as the Hellenic group, and all belong to the Indo-European family of languages. In ancient times Greece was divided, geographically, into three main parts, each of which had its own dialect. In Northern Greece, Aeolic was the common dialect; in Attica and that part of Asia Minor that belonged to Greece, Ionic was chiefly spoken; and on the island of Crete and in the Peloponnesus and in the colonies, Doric was most commonly used.

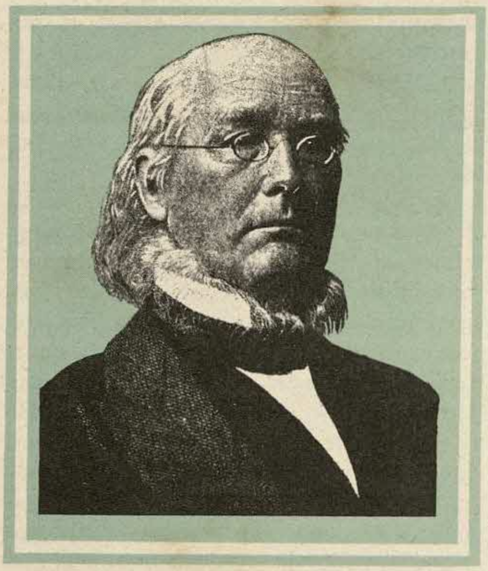
Because it was capable of more precise expression and because it was less harsh than the other two, Ionic became the chief language of literature. There were, however, three forms of the Ionic dialect. The old Ionic, in which Homer wrote the famous epics, the *Iliad* and the *Odyssey,* was followed by the new Ionic, which was used by Herodotus, the famous Greek historian. Attic, the third Ionic form, was the dialect of Athens, which was the center of Greek government and learning. Because this city was the greatest Greek center of culture, the Attic dialect became the standard language of the later classics. Some of the famous works written in this dialect were those of Aeschylus, Euripides, Xenophon, and Plato.

In the centuries that followed the decline of Greece as a great power, the language was modified, and during the Middle Ages, although the Greek tongue was spoken in the Byzantine Empire, it was not familiar to the people of the western European countries. However, during the Renaissance, when the people of Europe took a renewed interest in all ancient and classical things, the study of Greek was revived, and it has since occupied an important position as the language of scholars.

Today Greek is taught in many American colleges and universities, and a knowledge of the language is necessary to the study of ancient history and philosophy. Despite the many changes since it was first used by the ancient people of Asia and Europe, modern Greek can be read and understood by those who have studied only the ancient forms. It is interesting to note what a small contribution this ancient language has made to the comparatively new languages of French, Spanish, and English, although a large proportion of these languages can be traced directly to Latin. Among the common English words derived from the Greek are *apostrophe, geography, electricity, arithmetic, geometry,* and *apology.* See GREECE.

GREEK LITERATURE. See LITERATURE.

GREE'LEY, HORACE (1811-1872). One of the most influential American journalists of the last century, Horace Greeley, the noted newspaper editor, was loved by citizens of both North and South. Born in Amherst, N. H., he progressed from farm hand to printing compositor, and then to journalist. His first venture in the newspaper field occurred when he started the *Morning Post* in New York. In spite of its price of only a penny, however, the paper quickly failed. Another enterprise



ANTI-SLAVERY SPOKESMAN
Horace Greeley, America's greatest journalist of the nineteenth century, hated slavery but signed the bond of Jefferson Davis on principle.

brought him into wide notice, though it was not a financial success. For seven years, beginning in 1834, Greeley published the *New Yorker,* a weekly devoted to current news and literary items.

In 1840 he entered the political field with the publication of the *Log Cabin,* which supported Harrison and Tyler, the Whig candidates, in the exciting "log cabin and hard cider" campaign. Within a year he had founded the *Daily Tribune,* a paper that was to be the mouthpiece of Greeley's views on slavery and other topics of his time. He was its editor until his death.

Before the Civil War, he had been a sincere opponent of slavery, but in fairness to the South he did not openly support abolition, adhering to the principle of states' rights. He supported Lincoln during the war, however, because he believed that the secession movement did not represent the true view point of a majority of the people. At the close of the war, Greeley strenuously objected to the treatment administered to the South by the Union, and supported general amnesty or pardon for political prisoners. Greeley was one of the group who signed the bond for Jefferson Davis, the former President of the Confederacy, though his paper suffered a loss in circulation thereby.

In 1872, near the close of Grant's first term, dissatisfaction with the administration caused the organization of the Liberal Republican party, and Greeley, as the most prominent leader of the Liberals, was nominated by them for the Presidency. He also received the Democratic nomination, but Grant was easily re-elected. The death of Greeley's wife and the strenuous work of the campaign caused his health to fail, and he died a few weeks after the election.

Greeley was an outstanding representative of the old school of personal journalism. He not only edited his papers; he was the great personality behind them.

GREEN. The most common color in nature, green is found widely in plants, and is the color of many minerals. It is often seen in the plumage of birds and in the coverings of insects; even the waters of the ocean have a greenish hue. Green is one of the colors of the solar spectrum. It can be made by mixing blue pigment with yellow. Such green pigments as Paris green, emerald green, and imperial green are prepared by boiling copper acetate in a solution of a compound of arsenic and oxygen. Coal tar is now commonly used in preparing green dye, supplanting the old vegetable-compound preparations.

Green has been adopted as the national color of Ireland, which is sometimes called the Emerald Isle because of its lush green vegetation. To the Mohammedans green is a sacred color, and in medieval art it stood for repentance.

GREEN, WILLIAM (1873-1952). A leading figure in the group of trade unionists who favored organization by crafts, William Green became president of the American Federation of Labor in 1924 upon the death of Samuel Gompers. Born in Coshocton, Ohio, he received a public-school education. When nineteen he became a mine worker. From the beginning of his career, Green was active in the union movement, and in 1900 was elected sub-district president of the United Mine Workers of America. Of this organization he served as international secretary-treasurer from 1913 to 1925.

He was elected vice-president of the American Federation of Labor in 1913, and as his influence in that organization grew, he came into conflict with John Lewis, president of the powerful United Mine Workers, and leader of the Congress of Industrial Organizations (C.I.O.). The C.I.O. favored the plan of "one big union" —organization of all workers in any industry. The controversy split the Federation, and early in 1938 the A.F. of L. expelled the United Mine Workers and other unions participating in the C.I.O. They merged in 1955 as the A.F.L.—C.I.O. See LABOR ORGANIZATIONS.

In politics, Green was a Democrat. He served two terms in the Ohio senate. He was a delegate several times to the Democratic national convention.

GREENBACK PARTY. See POLITICAL PARTIES IN THE UNITED STATES.

GREEN'BACKS. This is now a popular name for paper money in the United States. It came into use in 1862, when the government issued fiat money printed in green ink. The money was not sound, because it contained only the government's promise to pay without any guarantee of gold or silver back of it. At several other times, efforts have been made to issue this sort of money, but unsuccessfully. A trend toward or movement in favor of printing such money is termed *inflation*. See MONEY.

GREENE, NATHANAEL (1742-1786). Surpassed only by Washington as a field commander, Nathanael Greene was responsible for winning the South in the Revolutionary War. A native of Potowomut, R. I., he became a member of the local militia in 1774, and a year later was advanced to the rank of brigadier general, commanding the Rhode Island forces. Later, General Washington promoted him to major general, and it was in this capacity that he gave a splendid account of himself in the battles at Trenton, Princeton, Brandywine, and Germantown.

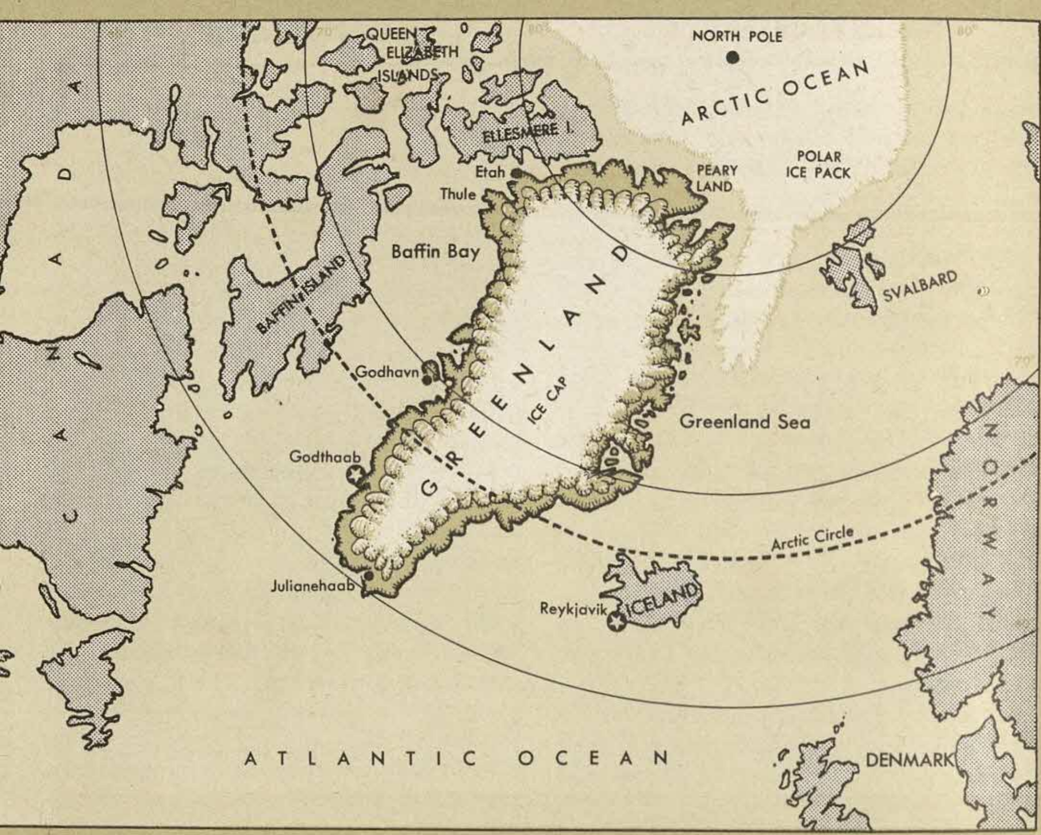
In 1780 he was made commander in chief of the Southern Army, and defeated the British in the Carolinas and Georgia. See REVOLUTIONARY WAR IN AMERICA.

GREEN'HOUSE. Most of the freshly cut flowers and many of the fresh vegetables which you see in midwinter have been grown in greenhouses, buildings constructed almost entirely of glass and steel. The plants are raised in long beds or benches which extend lengthwise through the building. The roofs of greenhouses are so designed that parts may be raised to provide ventilation. Heating is usually provided by steam or hot-water boilers, and numerous pipes keep the temperature uniform. Water is piped throughout the greenhouse and sprayed around the plants early in the morning, when the heat is increasing. New soil, composed of a mixture of sod and manure, is brought into the building each year, and replaces the old soil in the elevated benches.

Elevated benches are generally preferred by flower growers because better control and care can be given the flowers under this system. Vegetable growers, on the other hand, prefer ground beds, since this soil is not renewed annually, and the soil in these beds may be more easily prepared and fertilized.

Nearly all greenhouses are built on well-drained ground near a good water supply. They should be protected from both west and north winds and should have an abundant exposure to sunshine. *Forcing houses,* or *hothouses,* are greenhouses in which a high temperature is maintained to "force" the vegetables to grow faster. They are used exclusively for the raising of vegetables for the markets and for small seedlings such as tomatoes, cabbage, and mangoes. *Conservatories* are greenhouses devoted to the raising of flowers for display rather than for profit. They are often found in the parks of large cities.

The usual small-greenhouse operator is a sort of "jack-of-all-trades," raising not



GREENLAND—BIRTHPLACE OF ICEBERGS

only potted and cut flowers, but also vegetable seedlings for neighborhood gardens. Moreover, the owner of such an establishment must be skilled in preparing wreaths, sprays, corsages, and bouquets of whatever flowers are required for various occasions.

GREENLAND. Largely covered by a thick white ice cap, Greenland perhaps was too hastily named by its Scandinavian discoverer, Eric the Red, who saw a fringe of green vegetation as his ship approached shore in A.D. 984. It is the world's largest island, but 85 per cent of its 839,782 square-mile area is covered with a 1,000-foot layer of ice. The ice sheet that covered a great section of North America thousands of years ago deposited this glacial formation (see GLACIAL PERIOD).

Greenland is a self-governing part of the kingdom of Denmark. It is located between the Arctic and Atlantic oceans, ten miles east of the northernmost point of Canada and 448 miles from the North Pole. It belongs geographically to North America and is a strategic position for forecasting North Atlantic weather conditions. Most of its 27,000 residents are Eskimos living in small towns on the west coast.

The United States maintains an air base at Thule on the northwest coast, according to terms of a 1951 treaty with Denmark arranging for the defense of Greenland within the North Atlantic Treaty Organization. United States forces partially escape rugged winter winds by using roads, barracks, and warehouses built under the ice.

Northern Greenland gets four months of continuous sunshine during the summer. Winter in all of Greenland is long and cold, with no sunshine for four months. However, the climate has been getting milder. Seals have moved north to cooler waters ending an important industry, and cod have come into Greenland's waters.

Sheep are raised in the south. The soil is poor for farming and much food is imported. Eskimos hunt the musk ox, white bear, fox, and wolf, and trap ermine.

CAPITAL CITY IN A LAND OF ICE AND SNOW
Godthaab, situated on the southwest coast of Greenland, is the capital and chief seaport. It was founded by Danish missionaries in 1727, and has a population of about 1,000.

Greenland has the world's largest supply of cryolite, used in the production of aluminum, hard glass, and porcelain. The island also has deposits of lead, zinc, wolfram, graphite, and a poor grade of coal. Fishing for cod, halibut, herring, and shrimp is an important industry, providing food and an item for export. Greenland also exports minerals and animal skins. Most exports go to Denmark.

Telephones link the larger towns. Motorboats and kayaks travel along the coast. Planes use Greenland as a base between Scandinavian countries and North America.

Education is free and compulsory between the ages of 7 and 14. The language is Greenlandic, an Eskimo tongue. There is a college at Godthaab, the capital city.

Eric the Red and several countrymen established the first settlement in 985. Greenland remained independent until Norway annexed it in the thirteenth century. When Norway and Denmark united, Greenland became part of the new nation. Later Denmark controlled the west coast of Greenland and in 1917 took over the entire island. Greenland became a Danish crown colony in 1924 and the Danish constitution of 1953 gave Greenland equal status with other parts of the kingdom. Greenland elects two members to the Danish *Folketing,* or Diet.

GREEN MOUNTAIN BOYS. Ethan Allen and his Vermont militia, called the Green Mountain Boys, gave valuable aid to the thirteen colonies in the Revolutionary War. Formed at first in 1764, to resist New York's claims to the territory of Vermont, the militia joined in the struggle for independence at the very beginning, capturing Ticonderoga early in 1775. Later, the Green Mountain Boys took Crown Point and won the Battle of Bennington. For the story of the capture of Ticonderoga, see ALLEN, ETHAN.

GREEN MOUNTAINS. A part of the long Appalachian mountain range, the

Green Mountains extend from Connecticut to the Canadian border. Usually, however, the name is applied only to the mountains of Vermont. It was suggested by the beautiful evergreen trees which are so plentiful in the forests of the region. The highest points in the range are Mount Mansfield, Killington Peak, Mount Ellen, Camel's Hump, and Mount Abraham, all over 4,000 feet in height. There are large deposits of asbestos and slate; and Vermont's granite and marble, for which it is famous, are found chiefly in these mountains.

GREENWICH, *grin'ij,* or *green'ij,* ENGLAND. This little town, lying just outside London, is famous to the rest of the world because through it runs the imaginary zero longitude, the meridian from which all other longitudes are measured. Greenwich is located in the County of Kent about five miles southeast of London Bridge, on the Thames River. In the town is located the Royal Naval College, the buildings of which were used in the eighteenth century as a hospital for disabled seamen. On the grounds originally there stood the royal palace in which Henry VIII, Mary, and Elizabeth were born. Greenwich contains large shipbuilding yards, iron foundries, and engineering works. The civilian population is estimated at about 92,000.

Greenwich Observatory. Founded in 1675 by Charles II, the observatory is located on a hill in Greenwich Park. Because London light and smoke interfere with observations at Greenwich, after World War II a new site was selected for the Royal Greenwich Observatory at Hurstmonceux Castle, in Sussex. See LONGITUDE AND TIME.

GREGO'RIAN CALENDAR. In 1582 Pope Gregory XIII established the present calendar, through a reform of the Julian calendar. It is the basis for reckoning the ordinary year, called the *Gregorian year.* See CALENDAR.

GREG'ORY. In the history of the Roman Catholic Church, sixteen men named Gregory have occupied the Papal chair. Biographies of four who were outstanding follow:

POPE GREGORY THE GREAT

Elected Pope against his wish, Gregory I nevertheless took up his duties with great devotion.

Gregory I (about 540-604). Chief among the lasting accomplishments of Gregory I was the systematizing of the rituals and services of the Church. A wise administrator, he promoted the establishment of monasteries and the propagation of the Catholic faith throughout Europe.

Gregory was unwilling to become Pope at the time he was elected, in 590, since he wished to go to England as a missionary, a desire prompted by the sight of blond English youths being sold in the slave markets of Rome. Of a wealthy family, Gregory had studied law and had been a member of the Senate of Rome, before taking the vows as a monk.

Gregory VII (died 1085). His belief that the Pope alone should have power to appoint Church officials led Gregory VII, Pope from 1073 to 1085, into a prolonged quarrel with the German emperor, Henry IV. The quarrel began over the question as to whether the Pope or the German emperor should grant pastors the titles and privileges of their office. Gregory deposed several German pastors who had been given their authority by the emperor. This action so angered Henry that he attempted to depose Gregory with a sentence from the Council of Worms. The Pope retaliated by

THE THIRTEENTH GREGORY
Pope Gregory XIII, a patron of education who gave us our present calendar.

excommunicating Henry. In 1077, after a humiliating penance, the emperor regained admittance into the Church.

Henry, whose penitence was wholly insincere, had the Pope deposed again in 1080, and placed Clement III on the throne. Gregory was thrown into prison, but was later released. He died at Salerno in exile. In 1728 he was canonized.

Gregory XIII (1502-1585). A patron of education and the arts, Gregory XIII adopted our present-day calendar by Papal decree in 1582. He did much to educate the clergy and to bring unbelievers into the Church. Born in Bologna, Gregory settled in Rome and was elected to the Papacy in 1572. See CALENDAR.

Gregory XV (1554-1623). Crowned Pope in 1621, Gregory XV is remembered for the establishment of the Congregation for the Propagation of the Catholic Faith—an organization which has furthered the spread of Catholicism in many lands. He also established the method for conducting the Papal conclaves.

GREN′FELL, WILFRED THOMASON, SIR (1865-1940). Fishermen and their families who live in the bleak regions of Northern Newfoundland and Labrador owe much to Sir Wilfred Grenfell, the medical missionary who has been called "Knight-Errant of the North." He was born near Chester, England, and studied medicine at Oxford and at London Hospital. Advised to give his services to one of England's most worthy benefactions—the Royal National Mission for Deep Sea Fishermen—he spent three years with the North Sea fishing fleets as a medical missionary. These years were but the beginning of a life of self-sacrifice.

His heart was touched by the privations endured by the people of Labrador and Northern Newfoundland, and in 1892 he

THE LIFESAVING ANGEL OF LABRADOR
For many years Sir Wilfred Grenfell was the only doctor in all Labrador's huge territory.

began the work with which his name is everywhere associated. Hospitals, nursing homes, schools, orphanages, and stores were set up through his efforts, and his hospital ship, the *Strathcona,* brought comfort to suffering people up and down the long stretch of desolate coast.

Funds for his work were raised by lectures and writings, and Sir Wilfred was able to start a much-needed housing program and various industrial projects for the forgotten folk of the northland. To make these efforts more effective, the International Grenfell Association was organized in 1912. Grenfell was knighted in 1927. His books include *A Labrador Doctor, A Man's Faith,* and *The Romance of Labrador.*

GRESH'AM'S LAW. It is a commonly accepted fact that "bad" money will drive "good" money out of circulation. This is a simple statement of an economic law first set forth by an Englishman, Sir Thomas Gresham, in 1560. He meant that when money recognized as sound in value and money without good backing are both available, people will want the sound money and will keep it, leaving, eventually, only poor money in circulation.

When a government issues paper money which is not backed by security whose value is equal to the amount printed on the money, the currency is said to be *inflated.* In post-war Germany and certain weak Latin-American countries that have resorted to inflation, few coins of value were in circulation during the period of "bad" money.

In the United States, however, the dominance of paper money is due to the inconvenience and weight of silver; there the paper money is backed by adequate security in the Federal Treasury. Failure to maintain bimetallism in the United States is a good example of how Gresham's Law works. It was the legal monetary system from 1792 until 1873, when the country adopted the gold standard.

GREY, *gra,* JANE, Lady (about 1537-1554). For nine unhappy days in 1553, a bewildered, frightened girl of sixteen was queen of England. She was Lady Jane Grey, who was crowned against her will and lost her life because she held a throne she never wanted. Daughter of Henry Grey, the Duke of Suffolk, and a granddaughter of the sister of Henry VIII, she was named successor to the throne by the youthful Edward VI on his deathbed. Edward had been advised that Mary, a Catholic and the rightful heir, would persecute the Reformists, and so he named Lady Jane.

ENGLAND'S TRAGIC QUEEN
Lady Jane Grey was declared queen, and then reigned over England only nine days.

Nine days after she was named, she was deposed and Mary became queen. Then, after being imprisoned in the Tower of London for some time, she and her husband, Lord Guilford Dudley (son of the Duke of Northumberland), were executed.

GREY, ZANE (1875-1939). Tales of the Western plains, thrilling to those who love adventure, are the creations of Zane Grey, popular American writer. Grey was born in

Zanesville, Ohio. He was the author of more than forty books, most of which are fiction. Many of these have been adapted for the moving-picture screen as "Westerns." *The Last of the Plainsmen* and *Zane Grey's Book of Camps and Trails* are nonfiction and are considered the best of his work.

GREYHOUND, *gra'hound.* When man wanted a dog which would excel other animals in speed, he bred for long legs, strong muscles and bones, and good endurance, and the result was the greyhound. In hunting, these dogs depend on keenness of sight and fleetness of foot, rather than on scent.

The typical greyhound is a thing of beauty, at rest or in motion. It is probably the most graceful of dogs. It weighs from sixty to seventy pounds and stands about thirty inches high at the shoulder. The chest is narrow and the shoulders sloping, while the belly is greatly contracted. The head is graceful and slender, but rather powerfully jawed.

FLEET FEET

The greyhound, fastest of dogs, can hit a pace well over thirty miles an hour, and provides great sport as a racing animal.

Greyhounds are short-haired and of many different colors. The name has no reference to the color, though there are dark-gray forms. *English* greyhounds are probably the best type. *Italian* greyhounds are smaller, and *whippets* are small forms bred for racing.

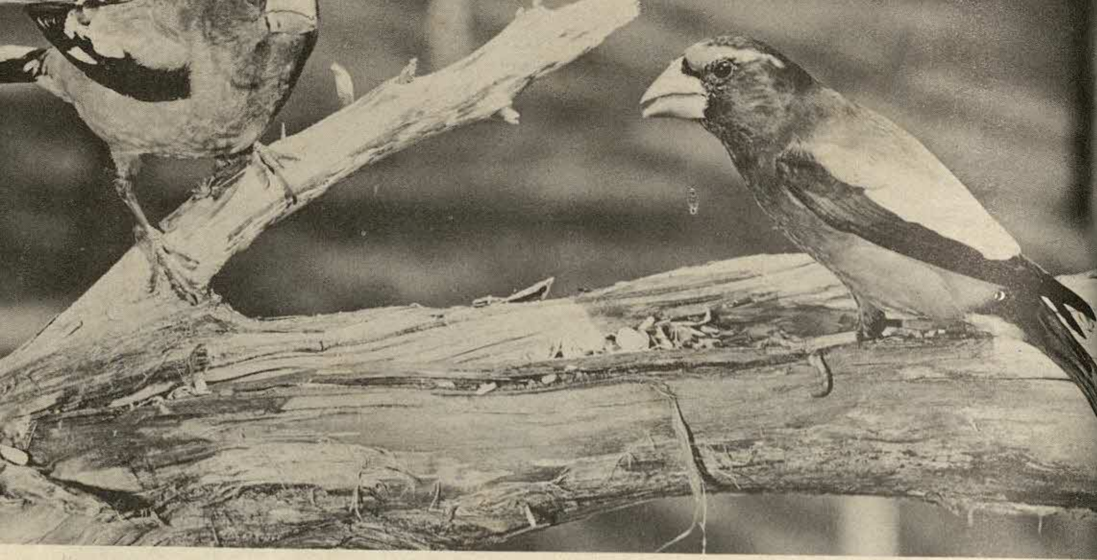
NORWAY'S GREATEST MUSICIAN

Starting out as a concert pianist of great promise, Edvard Grieg turned composer, gained world fame.

GRIEG, *greeg,* Edvard Hagerup (1843-1907). An outstanding Scandinavian composer was Edward Grieg, a musical genius who was both a great performer and a great creator.

Grieg was born at Bergen, Norway, and received his musical education in Copenhagen and Leipzig. Later he toured through Europe and England as a concert pianist, and met with great success. However, his lasting fame comes from his own compositions, often based on Norwegian folk music and embodying the genuine Scandinavian spirit. His works are marked by beautiful melodic lines and technical excellence. Perhaps his best-known work is the *Peer Gynt Suite.*

GRIFFIN, *grif'in.* Half eagle, half lion, according to ancient myths, the griffin was a terrifying creature. In sculptured form these unnatural monsters are often seen on Gothic cathedrals and other buildings erected in the Middle Ages. They were



Jack Dermid

EVENING GROSBEAKS—BLACK AND YELLOW BEAUTIES OF NORTH AMERICA
The female, left, and her mate live on seeds. Their favorite—seeds of frozen apples.

also common in the very ancient art of the Assyrians and Persians. Usually the head and wings are those of the eagle and the body that of a lion, but sometimes they are reversed. Other fierce animals such as the tiger are also represented.

GRIMM, Jakob Ludwig (1785-1863) **and** Wilhelm Karl (1786-1859). Lovely Snow White, tiny Tom Thumb, and adventurous Hansel and Gretel are known and loved the world over because of the brothers Grimm. These two German scholars were the authors of *Grimm's Fairy Tales,* a book that has found its way into homes, schools, and libraries everywhere.

Born in Hanau, Germany, they attended the University of Marburg, and later taught in Berlin. Besides fairy tales, they wrote a *German Dictionary,* and Jakob wrote *History of the German Language, German Grammar, German Mythology,* and *Origin of Language.* But it was their collection of folk legends that brought them fame. The two wandered about the country, listening to the age-old stories and then recalling them for their book. Thus "Rumpelstiltskin," "The Goose Girl," and the other tales that capture the imagination of children and adults were preserved for the world.

GRISTLE, *gris''l.* See Cartilage.

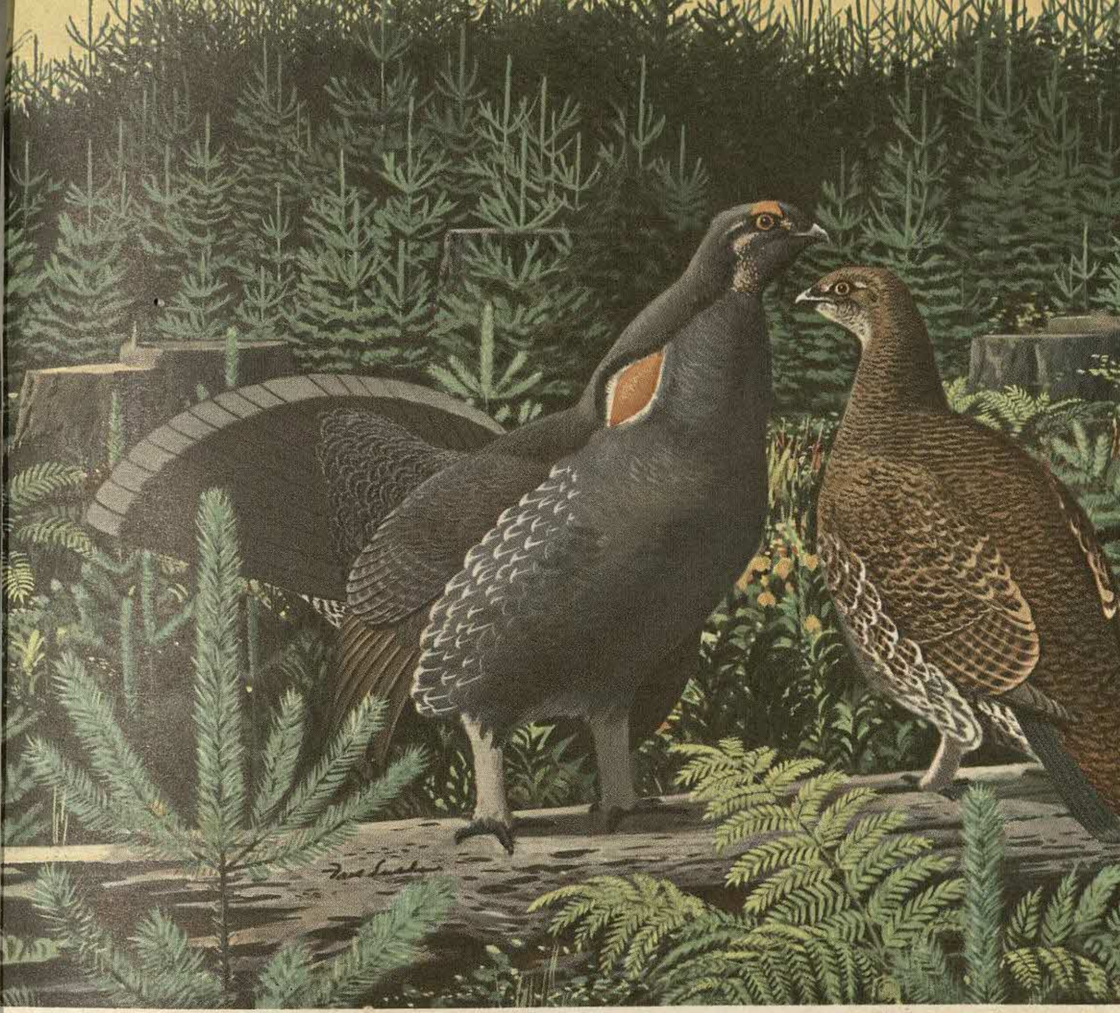
GROSBEAK, *grose' beek.* As their name implies, the grosbeaks are a group of birds with short stout bills suited to crushing seeds and fruit pits. They are related to the sparrows and finches, and they are valuable because they feed on cankerworms, tent caterpillars, beetles, brown-tail moths, and other insects. One of the best known species in the United States is the *rose-breasted grosbeak,* a bird about eight inches long. The female has dull gray-brown and buff plumage but the male is a handsome black and white with a beautiful rose breast. His song is rich and clear. In summer the bird is found as far north as Canada; it winters from southern Mexico to South America. The *black-headed grosbeak* is more common in western North America.

GROUNDHOG. See Woodchuck.

GROUND SQUIRREL. Resembling a large chipmunk, the ground squirrel has a shorter and less bushy tail than has the gray squirrel. It digs its burrow in the ground. Found principally in North America, this species is very destructive to grain crops. See Gopher; Chipmunk.

GROUPER, *groo' pur.* In and near the tropics, fishes are much more brightly

COLLEGE
BANIPUR.



Weyerhaeuser Company

DRUMMER BOY OF THE BIRD WORLD

When the male blue grouse courts his mate he struts about on a log with the bright wattles above his eyes distended and the matching "drums" on his throat exposed. With these drums he can expel air with a vibration that makes a *boom, boom, boom* sound.

colored and elaborately patterned than in northern waters. Some, including those called groupers from the Portuguese name *garoupa,* are able to change their colors.

All of the groupers in America are good food fishes. They are usually two or three feet long and weigh ten to fifty pounds. They include the *red grouper* found from Virginia to Texas; the *Nassau grouper* of Key West, Fla.; the orange-spotted *rock hind* of the Florida Keys; *speckled hind* of the Gulf of Mexico, brown spotted with lavender; and the *scamp,* named for its ability to steal bait. Since these fish may change their colors when frightened, the colors used to describe them are probably not their normal hues.

GROUSE. Sometimes called a "partridge" in the North and a "pheasant" in the South, this game bird belongs to a family that includes the *ptarmigan* of Arctic regions and the prairie chicken of the north-central parts of North America.

Grouse for the most part are ground

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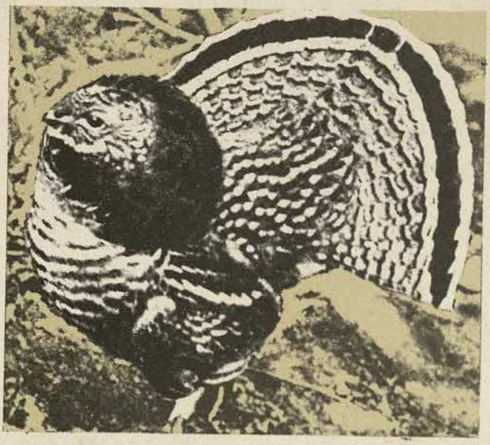


HUNTSMAN'S PRIZE—GOURMET'S DISH
Few game birds furnish such thoroughly good sport as the ruffed grouse, a fast-flushing, clever flyer.

birds, more or less fowl-like in appearance. They associate in small flocks or coveys and depend on their dull colors to protect them as they lie close among grasses and leaves. Not until a hunter or dog is right on them will they rise swiftly, with a tremendous whir. Thus they offer good "sport," and their flesh is most excellent, except when some of the northern species have been feeding on evergreen buds.

The *ruffed* grouse of the northeastern woods is one of the finest upland game birds. Other species are the *Canada grouse,* or *spruce partridge,* and the *Franklin* and *sage* grouse of the West. See PARTRIDGE; PHEASANT.

GRUB. The larvae, or young, of beetles, bees, wasps, and other insects are generally known as grubs. See INSECTS.

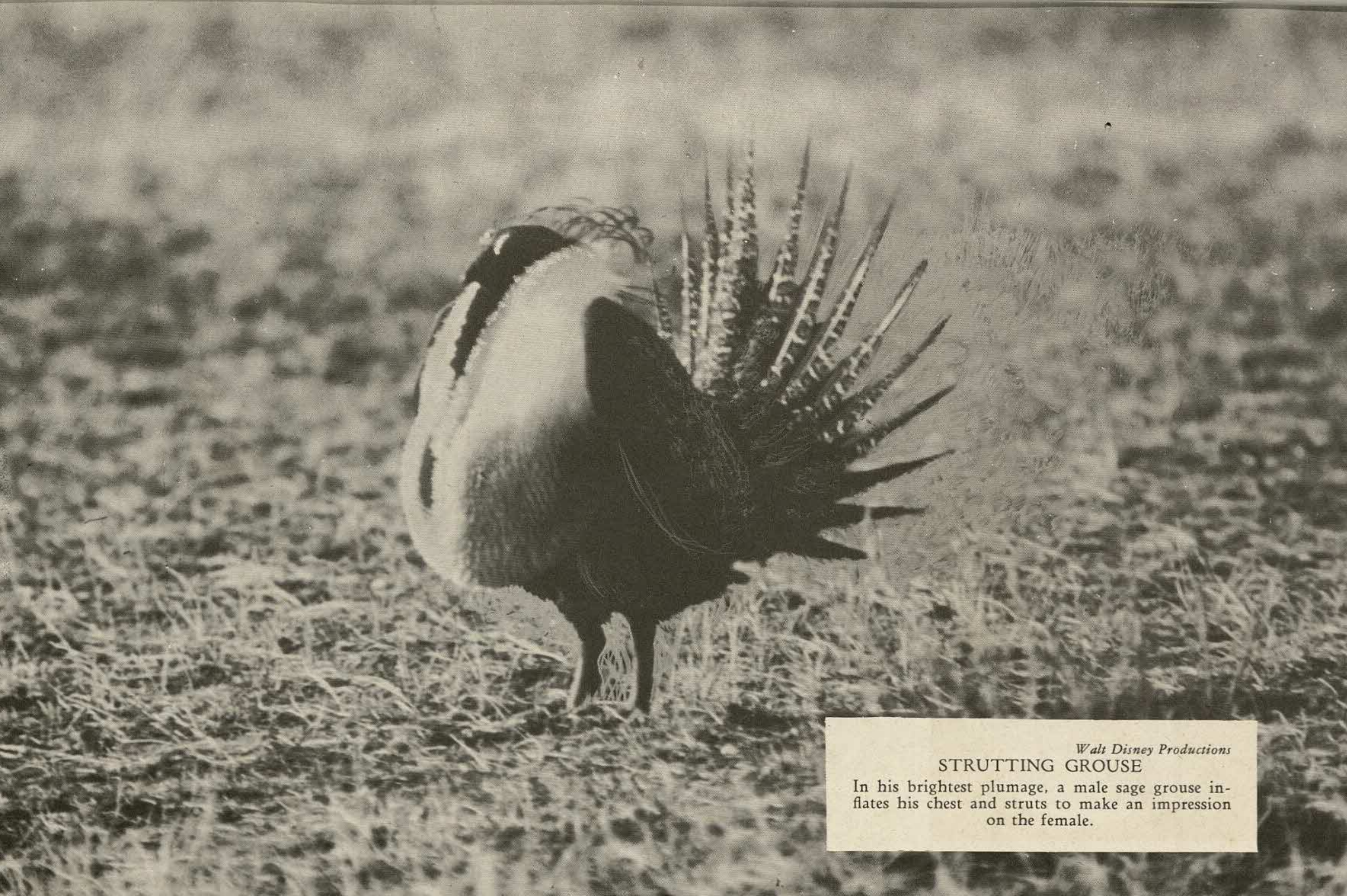
GUADALUPE HIDALGO, *gwah da loop' he dal'go,* TREATY OF. The treaty ending the war between the United States and Mexico was arranged at Guadalupe Hidalgo, a town near Mexico City, and was signed February 2, 1848. It made the Rio Grande the southern boundary of Texas, and ceded the following territory to the United States: California and what is now Nevada, Utah, most of Arizona and New Mexico, and parts of Wyoming and Colorado. The United States agreed to pay Mexico $15,000,000 and also to assume payment of all claims, not in excess of $3,250,000, held by Americans against Mexico. See MEXICAN WAR, THE.

GUADELOUPE, *gaw de loop'.* In the West Indies lie two islands which make up the French department of Guadeloupe. The larger one, of volcanic origin, is Guadeloupe proper. The other, Grande Terre, is of coral formation and is much flatter than Gaudeloupe. Five smaller islands are dependencies of Guadeloupe. The combined area of the group is 688 square miles.

The climate of the area is hot and humid, and hurricanes occur frequently. The islands have fertile soil, and good crops of sugar, coffee, cacao, bananas, and manioc are produced. Basse-Terre, with a population of 10,000, is the capital, and Pointe-à-Pitre, with a population of 42,000, is the largest city. The total population of the seven islands is about 275,000. France obtained final possession of Guadeloupe in 1814. After many years as a colony, it became a department of France in 1946.

GUAM, *gwahm.* Lying in the Pacific Ocean, just east of the Philippines, is the island of Guam. Now the headquarters of the United States Navy in the Pacific, it has belonged to the United States since the close of the Spanish-American War, in 1898. Guam is a volcanic island about thirty miles long and has an area of about 206 square miles. Guam fell to the Japanese in December, 1941, but was retaken by American forces in August, 1944.

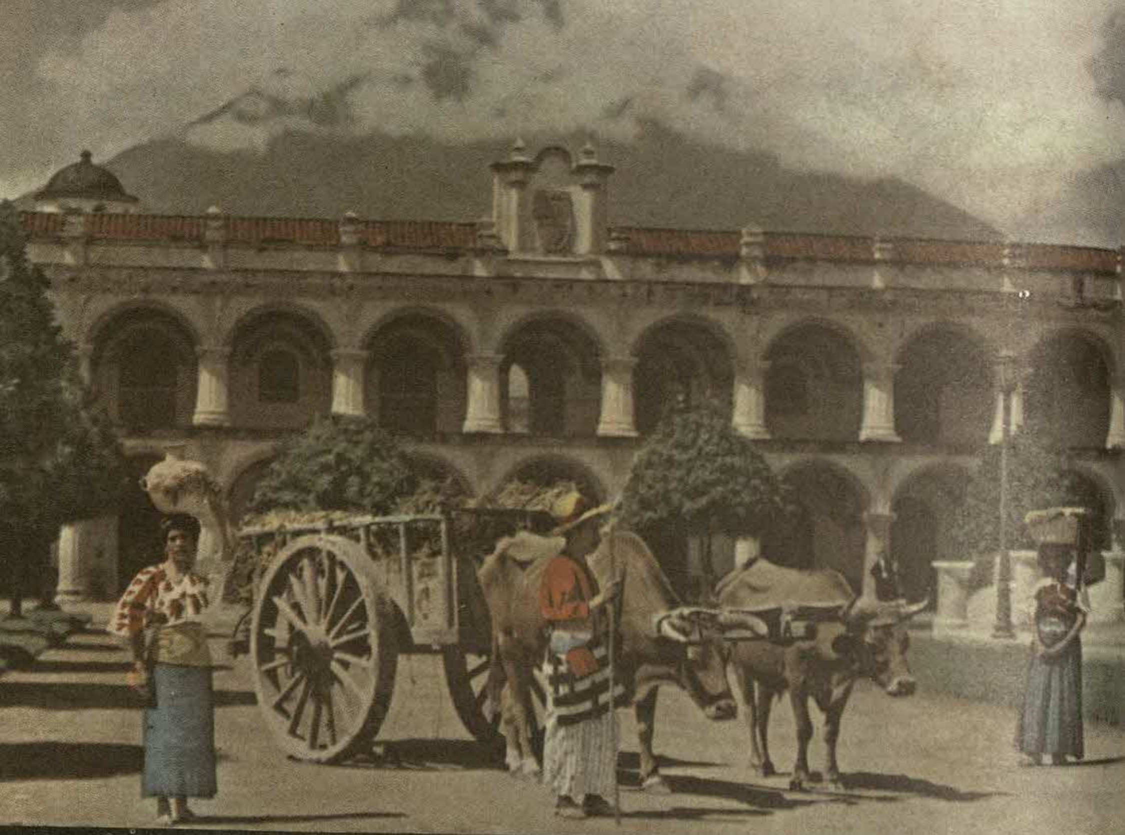
The chief agricultural products of the island include maize, rice, sweet potatoes, copra, tropical fruits, coffee, cacao, and tobacco. Copra and coconut oil are major exports. Besides farming, fishing is an important occupation. Most of the 39,000 people are of Malay descent. Although they have a language of their own, English is taught in the schools, and elementary education is compulsory. There is a governor, appointed by the President, and an elected congress. Agaña is the capital. Piti, the chief port, can be entered by foreign vessels only with the permission of the United States Navy.



Walt Disney Productions

STRUTTING GROUSE

In his brightest plumage, a male sage grouse inflates his chest and struts to make an impression on the female.

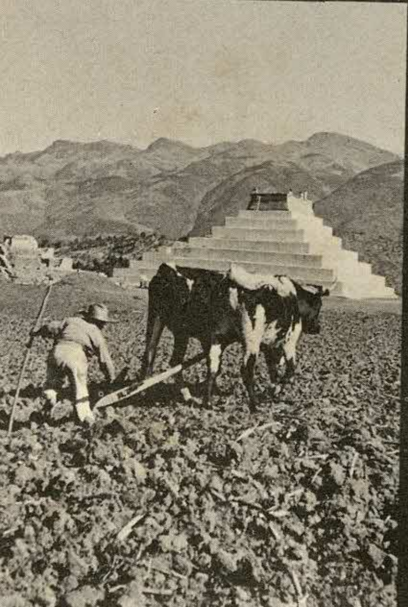


Courtesy Grace Lines

QUICKENING THE PACE OF GUATEMALAN HISTORY

Progress was very slow for centuries after the cultures of the Spaniards and the Mayans united in Guatemala. Oxen, harnessed to a farmer's cart in Antigua and to a plow in the shadow of a reconstructed Mayan temple, indicate the country's lack of mechanization. Today, however, specialists from other lands encourage Guatemalans to study modern techniques in child care, farming, education, housing, and other fields.

United Fruit Company



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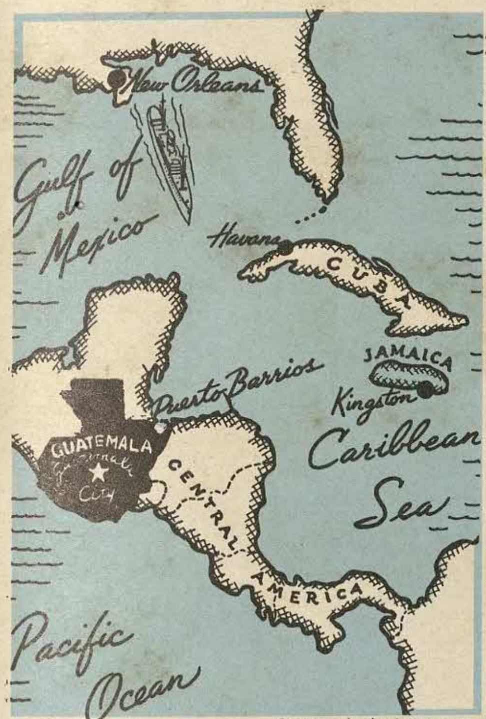
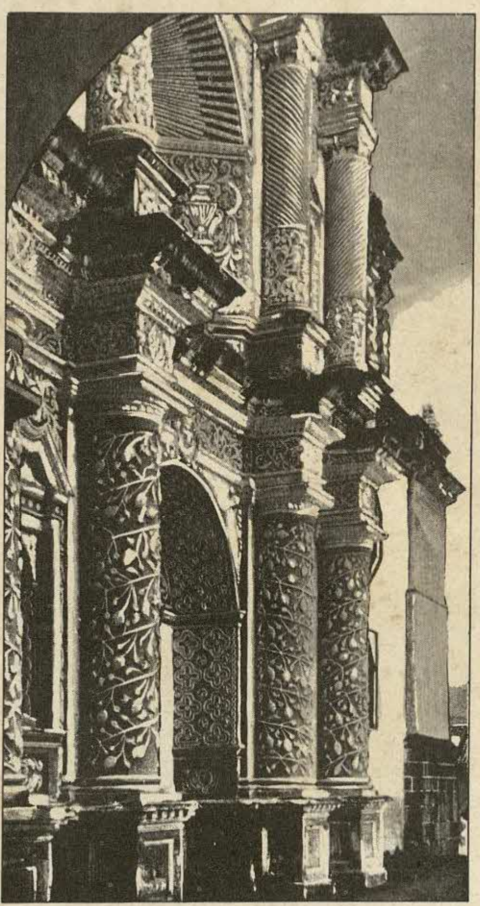


Courtesy United Fruit Co.

TROPICAL MOUNTAIN PARADISE
Guatemala is a tiny country, but its beautiful setting makes it a popular haven for tourists.

GUATEMALA, *gwah te mah'lah*. With rich, fertile, well-watered soil, a varied climate, and extensive forest regions, Guatemala, second largest of the Central American republics, leads all the others in population. It has a coastline two hundred miles long on the Pacific, as well as seventy miles of coast on the Atlantic. The Pacific forms its southern boundary. To the north and west is Mexico, to the east El Salvador and Honduras. The country lies entirely within the tropic zone. Its area of 45,452 square miles approaches that of the state of New York. The population of Guatemala is about 3,754,000, which is greater than that of Georgia.

In the central and southern plateaus and mountains, the temperature is pleasant and healthful, but in the hot, humid lowlands, tropical fevers are abundant. Rainfall is well distributed throughout the year.



Courtesy United Fruit Co.

GUATEMALA'S SPANISH GRACE
Gorgeous architecture of the days of Spanish rule still lends great dignity to Guatemala City.

The most productive agricultural lands lie in the central plateau region, although farming is the chief industry throughout the country. The most important export crop is coffee. Bananas also constitute a large part of the country's exports. Other leading products are chicle (used in making chewing gum), sugar, cereals, tropical fruits, rubber, and lumber. Cattle raising is also an important occupation, and the hides are valuable articles of export. The country's chief trade relations are with the United States, Great Britain, Mexico, and Canada.

Few foreigners live in Guatemala; most of its population is made up of native

(1, 2) Courtesy United Fruit Co.
(3) Courtesy American Can Co.

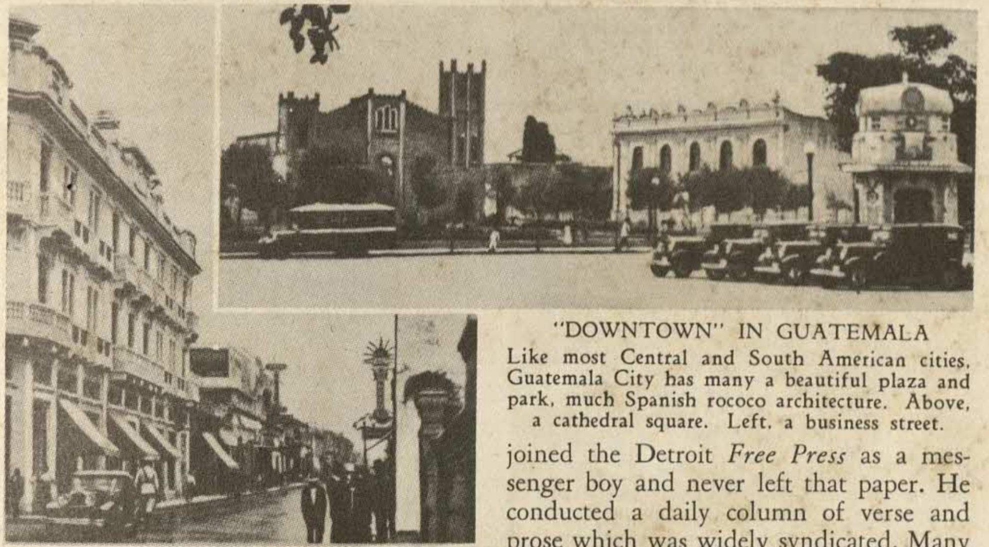
LAND OF SUNSHINE AND GAIETY
Nobody hurries in Guatemala. Why bother? (1) A wandering marimba player obliges with a tune. (2) A public fountain. (3) Luncheon and siesta in a Guatemala "restaurant." (4) Colorful Guatemalan Indians in a tiny hill town.

Indians, with a few Spanish and mixed peoples. Guatemala has many schools that are free and compulsory. The people are allowed to worship as they please, but most of them are Roman Catholics.

Situated on a high plateau is Guatemala City, the largest city and the capital of the country. It is modern with large buildings and wide boulevards, and it has many beautiful parks with imposing monuments of the early Spaniards who settled the country. Here is located the University of Guatemala. The population is about 295,000. Other important cities are Quezaltenango, Coban, Zacapa, and Totonicapan.

The country was conquered by Spain in 1524 and remained under its control until 1823, when it joined the Confederation of Central America. In 1839, after the Confederation was dissolved, Guatemala became an independent state. The republic was shaken by a major civil war in 1906. Guatemala's constitution provides for a National Assembly elected by popular vote. The executive power is held by a President, who is elected for a six-year term. A Council of State assists him.

GUAVA, *gwah'va.* Jelly, preserves, and jam are made from this tropical fruit, which is also eaten fresh and used in pies.



"DOWNTOWN" IN GUATEMALA
Like most Central and South American cities, Guatemala City has many a beautiful plaza and park, much Spanish rococo architecture. Above, a cathedral square. Left, a business street.

The guava tree belongs to the myrtle family and grows wild from Mexico south to Peru. The fruit is two to three inches in diameter and roundish to pearlike in shape. The skin is thin and light yellow. Just beneath it is a layer of granular pulp, and in the center is a softer pulp containing small hard seeds. The flesh varies in color from white to deep pink, and when ripe has a sweet or slightly musky flavor and a strong aroma. Guava jelly has a slight tang and is amber-colored. The jam is sold under the name guava cheese. Guava trees are grown in the United States in Southern California and in Florida. In California the plant is called *lemon guava.*

GUERRIERE, *gair yair',* THE. A decisive battle in the War of 1812 was fought on August 19, 1812, between the *Guerrière,* an English frigate, and the United States ship the *Constitution.* See CONSTITUTION, THE.

GUEST, EDGAR ALBERT (1881-1959) Self-styled as the people's poet, Edgar A. Guest won this reputation because of his appealing poems of everyday life. His understanding and directly simple style endeared him to many readers.

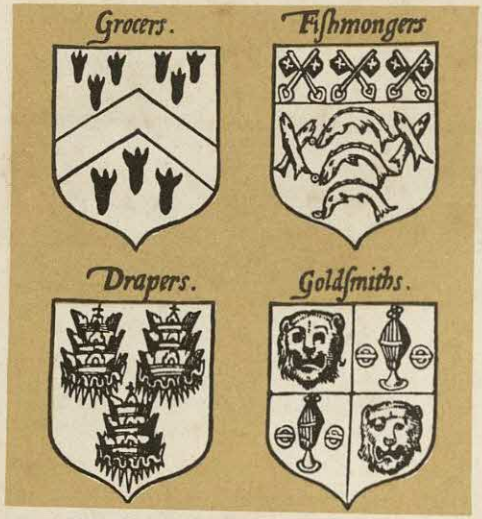
Born in England, Guest came to America at the age of ten. He received only a high-school education. At an early age he joined the Detroit *Free Press* as a messenger boy and never left that paper. He conducted a daily column of verse and prose which was widely syndicated. Many volumes of his poems have been published.

GUIANA, *ge ah'nah.* See BRITISH GUIANA; FRENCH GUIANA; SURINAM.

GUILD, *gild.* In medieval times, people of similar occupations and interests organized guilds to control working conditions and prices for the mutual advantage of the members. There were two main classes of guilds: the *craft* guilds, composed of those who made things, such as the silversmiths; and the *merchant* guilds, comprising those who sold things.

The craft guild kept the standard of goods on a high level, passing many laws which prevented workmen from using poor materials. The members of the guild were generally given the sole right to practice the craft. In some countries, permission of the guild had to be secured before a man could enter the craft. These guilds were composed of masters, journeymen, and apprentices. The latter two classes had to demonstrate their skill in the craft before they could rise to the position of master.

The guilds of the Middle Ages were very strong and often played an important part in city government. In this way they acted as a check on the power of the nobles and made for more freedom for the individual and the town. In the English guilds, the members gained many political advan-



LABOR UNIONISM'S ANCESTRY
The medieval craftsmen's guilds had heraldic emblems; much secret fraternal ritual and code.

tages, such as being given the title of *freemen* and the right to vote. The German guilds at one time won the right to bear arms in the protection of their interests. Although abolished by the emperors many times, German guilds remained very powerful until the nineteenth century.

Religious guilds were frequently formed for charitable purposes. They cared for their sick and aged members. They were common in the twelfth century, but were finally abolished in England by Henry VIII.

The term is applied today to some organizations of workers, as, for example, the Newspaper Guild of America.

GUILDER, *gil'dur,* or **GULDEN,** *gool'den.* The principal unit of money in Holland is the guilder, a golden coin which has varying value in relation to United States currency. The guilder has also been called the *florin.*

GUILLOTINE, *gil'lo teen.* Aristocrats and other enemies of the Revolutionists in France met death by the guillotine, an instrument that beheaded its victims. Similar devices had already been used in other countries in the Middle Ages. The guillotine is still used as the official means of capital punishment in France.

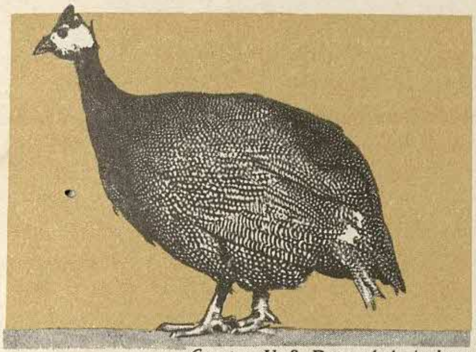
The guillotine consists of a platform with two tall uprights on either side. A sharp, weighted, knife-edged blade slides between the uprights. The victim's head is placed in a groove on a raised part of the platform so that the neck is directly in line with the blade, which is raised to the top and released. The blade falls with tremendous power, cleanly severing the victim's head. The instrument was named for Dr. Joseph Guillotin, who suggested its use in 1792. During the Reign of Terror, many thousands of persons were executed by this machine. See FRENCH REVOLUTION.

GUINEA, *gin'e,* REPUBLIC OF, a republic formed from French West Africa. It faces on the Atlantic Ocean, and is bounded by the republics of Senegal, Ivory Coast, and Liberia, Sudanese Republic, Portuguese Guinea, and Sierra Leone. It became independent October 2, 1958, and chose to leave the French Community. Its area is 96,865 square miles, and its population is about 2,507,000. Its capital is Conakry. Guinea secured loans from Russia for its internal development. Agriculture is the chief industry.

GUINEA, a name formerly applied to a large region on the west coast of Africa. Now it is the name of the Republic of Guinea, a former French colony; Portuguese Guinea, to the northwest of the republic; and Spanish Guinea, situated between the republics of Cameroon and Gabon. The republic and the two colonies face the Atlantic Ocean.

GUINEA, an old English coin issued from about 1663 to 1817. It was worth twenty-one shillings. The first guineas were struck of gold from Guinea in Africa, and this gave the coin its name. Professional people were accustomed to estimating their fees in guineas in the old days. The guinea was replaced by the sovereign. See SOVEREIGN.

GUINEA FOWL. The sharp screech which guinea fowls make in unison when disturbed or frightened, as they roam about the fields, is as good as an alarm or night watchman to scare away unwelcome guests



Courtesy U. S. Dept. of Agriculture

FEATHERED FARM WATCHMAN

Guinea fowl screech loudly when disturbed, warning of marauders. They are also scavengers.

or to apprise their owner that something is wrong. Very little is known of the early history of guinea fowl, in either their original home country or in America. It is assumed that they were brought early to America on board trading vessels. The original variety is, undoubtedly, the Pearl guinea of Africa.

The Pearl guinea is uniform in color and in plumage markings, the general effect being a dark purplish gray, each feather being marked with round white spots resembling pearls. It is from these peculiar feather markings that it derives its name.

The guinea fowl belongs to the helmeted branch of the poultry family. The helmet, or horny, fleshy growth directly on top of the head, corresponds to, and is in the same position as, the comb of our domestic fowls. The entire head of the guinea fowl and a portion of the neck are bare of feathers. These feather-free tracts, together with the helmet-shaped comb, are always bright red in color.

GUINEA PIG. Originally, the family of rodents to which the guinea pig, or *cavy* (*ka've*), belongs was confined to South America. All its members have stout, heavy bodies, and short legs and tails. There are four toes on the front feet and three on the hind feet. The Spaniards who first explored the Andean regions of South America found the animals fully domesticated and being raised in large numbers by the Indians, who used them for food. From there they were taken to Europe.

BIOLOGY'S FURRY FRIENDS

Because they are prolific, easy to handle, and quick to react, guinea pigs are used in bacteriological experiments.

The value of guinea pigs for use in research laboratories, hospitals, and medical institutions is well known. Their small size, the ease with which one is able to handle them, and their ready susceptibility to inoculation render them especially well suited for use in the isolation of disease-producing organisms. At present they are being reared in great numbers for use in the study of diseases to which livestock and human beings are subject, and in the production, testing, and standardizing of serums, vaccines, and antitoxins.

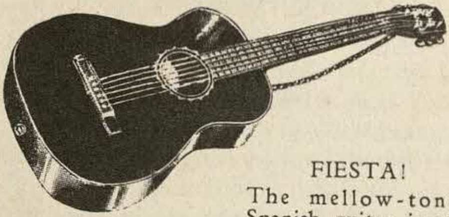
VICTIM OF ROYAL INTRIGUE

The Duke of Guise was stabbed by forty-five assassins.

GUISE, *geez.* Important in French history in the sixteenth and seventeenth centuries, the family of Guise was a branch of the ducal House of Lorraine.

Francis of Lorraine (1519-1563), the second Duke of Guise, was the power behind the throne during the reigns of Henry II and Francis II of France. He was assassinated while besieging Orleans, the stronghold of the Huguenots (French Protestants).

Henry I of Lorraine (1550-1588), third Duke of Guise, took part in the Massacre of Saint Bartholomew's Day and had a hand in the assassination of Coligny, leader of the Huguenots. Duke Henry was himself assassinated by order of King Henry III, who feared his popularity with the people. The Guise family became extinct in 1675. See FRANCE.



FIESTA! The mellow-toned Spanish guitar is still a popular instrument.

GUITAR, *ge tahr'.* The melodious gay guitar is especially associated with the romantic music of Spain. It resembles the violin, but has six strings, and these are plucked with the fingers instead of played with a bow. The strings may be of gut, metal, or a combination of these two. The "neck" of the instrument is marked off by brass *frets* which indicate the positions of the fingers for governing pitch. The actual tone is produced by "strumming" the strings with the fingers and thumb of the right hand while adjusting the pitch with the left.

Because it is simple to play, the guitar is popular with entertainers and dance orchestras.

GULDEN, *gool'den.* See GUILDER.

GULF STREAM. Florida, the vacationer's paradise, owes its delightful climate in part to the warm, deep-blue waters of the Gulf Stream, the famous current which sweeps into the Atlantic from the Gulf of Mexico. It has its origin in the current from the warm, tropical section of the Atlantic Ocean which strikes the eastern coast of South America and splits into two sections. One section proceeds southward along the Brazilian coast, while the other flows to the Caribbean Sea and into the Gulf of Mexico. This latter current, as it continues its journey around the tip of Florida and toward the north, becomes the Gulf Stream.

As the current moves north along the eastern seaboard of the United States, it spreads slightly fanwise toward the east, and finally loses itself in the North Atlantic stream off the fishing banks of Newfoundland and Labrador. There is a movement of water northeasterly, toward Europe from this point, which is called the Gulf Stream drift.

In the Gulf, the speed of the current is about sixty-five miles a day. This speed decreases steadily as the stream proceeds northward, and off Newfoundland its movement can hardly be noticed.

The surface heat of the water is high in the Gulf, but it diminishes rapidly. More important than the temperature of the water, however, is the warmth it gives to the winds blowing over it. These warm, moist winds make the climate of the British Isles and Norway much milder than that of other lands so far to the north.

GULLS, *gulz.* Anyone who has lived near the seashore, the Great Lakes, or other large bodies of water is familiar with the gulls, or *sea gulls,* as they are commonly called. They add life and interest to the scene as they soar through the air or swim in close flocks on the water, searching for food. Now and then they utter shrill, harsh screams.

Gulls belong to the family of long-winged swimming birds including also the various species of tern. Gulls differ from terns in being more truly sea birds. They are better swimmers, though less graceful on the wing than terns. Their bills are slightly hooked instead of straight, and their tails are usually square or rounded instead of forked. For the most part, gulls breed north of the United States, but winter south of their nesting sites. The nests are usually placed on the ground or on rocky ledges.

Gulls feed mainly on fish, other water

BEAUTIFUL SCAVENGER OF THE SEA
The gulls which soar so gracefully over the water are omnivorous eaters. They sometimes follow ships for miles in quest of scraps.

animals, and refuse of all kinds, though some of the inland birds eat larvae and various insects. They are a familiar sight in large harbors, and frequently follow steamships for long distances, waiting for scraps of food to be thrown overboard.

GUM. Usually a plant product, gum is a tasteless, shapeless substance. True gums dissolve in water, but many so-called gums, including those known as vegetable mucilages, do not. True gums do not dissolve in alcohol.

Gums include such substances as rubber, chicle, cherry gum, tragacanth, and others. We eat them in candy, use them to finish our clothes, and to stiffen our hats, and they are found in the inks with which we write letters and the adhesive with which we seal them.

GUM ARABIC. A gum yellow or reddish in color, gum arabic is used as a thickener for mucilage and inks. It comes from the acacia tree found in Northern Africa and Asia. See MUCILAGE.

GUM RESINS, *rez'inz.* The little block of evil-smelling asafetida which people once wore to prevent disease was a gum resin. Made from the juices of certain plants, gum resins are composed of a gum which can be dissolved in water and a resin soluble in alcohol. Most gum resins are, therefore, soluble in dilute alcohol. These resins, among which are aloes, ammoniac, gamboge, and myrrh, are used mostly in medicine. They are usually brittle and opaque. See GUM; RESINS.

GUN. See CANNON; HOWITZER; RIFLE.

GUN'BOAT. The small, armed warships which patrol coastal waters and rivers are gunboats. Both the British and the American navies have used gunboats for such duty for a great many years. Besides small arms and machine guns, gunboats usually carry at least one heavy gun.

GUN'COTTON. Treating cotton with a strong nitric- and sulphuric-acid mixture produces guncotton without particularly altering the appearance of the substance. Its discovery, announced in 1845, is credited to the German chemist Schonbein, who was a professor at Basel, Switzerland. However, it had been known for many years previous that a highly explosive substance could be prepared by treating a vegetable fiber with nitric acid. The early attempts to substitute guncotton for gunpowder resulted disastrously on account of its irregular action. Later it was made safer, and was used as a military explosive to some extent before the development of the more modern explosives.

There are many materials produced from the cellulose nitrate made by treating cotton with nitric acid. Among these are smokeless powder, photographic films, and varnish. Collodion, also discovered by Schönbein, is a cellulose nitrate dissolved in ether and alcohol. It is used extensively in surgery as a protective covering while wounds are healing. See EXPLOSIVES.

GUN'POWDER. One of the world's important inventions is gunpowder, an explosive made up of saltpeter, charcoal, and sulphur. Credit for the invention is gener-

A FRUSTRATED FANATIC BROUGHT TO JUSTICE
Guy Fawkes, conspirator in England's famous conspiracy to blow up the Houses of Parliament, faces King James I, after the discovery of the Gunpowder Plot, in 1605.

ally given to the Chinese, who made use of it for fireworks as early as the ninth century. Introduced into Europe in the twelfth century, it was not generally adopted in warfare there until about the sixteenth century.

The successful performance of any gunpowder depends upon the purity of the materials used. The saltpeter (potassium nitrate) is purified by dissolving it in hot water and allowing it to crystallize; the sulphur is prepared by distillation; and the charcoal, by burning alder or willow in iron vessels. Each substance is then powdered; all three are mixed, then moistened and ground under heavy rollers. The mixture is then placed under a giant hydraulic press, where the pressure is varied according to the powder desired. High pressure produces a highly explosive, fast-burning powder; low pressure, a slow-burning powder. As the powder comes from the press in "press cakes," it is broken into grains of varying sizes and polished.

Kinds and Uses of Powder. Powder for cannons and blasting is not as *fast* as that used in rifle cartridges. As the power of the powder is partly dependent upon the amount of saltpeter used, rifle and cannon powder each contain about seventy-five per cent saltpeter; blasting powder, which explodes more slowly, about seventy per cent. The sulphur and charcoal content varies with the use to which the powder is put. Other explosives, including smokeless powder and dynamite, have largely replaced black powder for blasting and as ammunition for modern firearms, but it is used as a priming charge to fire smokeless powder, and is employed in fireworks and fuses, and as a bursting charge for shrapnel.

GUNPOWDER PLOT. England still observes Guy Fawkes' Day each November fifth, the anniversary of the Gunpowder Plot. This was a plot to blow up the Parliament buildings on November 5, 1605,

SWEDEN'S GUSTAVUS ADOLPHUS DIES A HERO'S DEATH

The great king of seventeenth-century Sweden, who did much to win glory for his kingdom, was killed at the Battle of Lützen, in which his army was victorious.

and to kill the king and the members of Parliament at the opening session because of the government's severe policy against Roman Catholics. In a traditional ceremony, colorfully uniformed "Beefeaters" still search the cellars of Parliament for the great store of gunpowder which had been hidden there on that day. Guy Fawkes, Robert Catesby, and several other conspirators were involved. The plot was discovered when one of the conspirators wrote a relative asking him to stay away from Parliament on that day. Fawkes and the others were put to death at Westminster.

GUR'NARD. About forty different species of fish belong to the gurnard family, and they all share an unusual distinction—they can make noises. Brought to the surface, they emit a strange sound which has given them the nickname "grunters."

Included among the gurnards are several deep-sea varieties, characterized by an angular head covered with bony plates, and a long, tapering body. They live in the depths of the ocean, and many of them are brilliantly colored. Perhaps the best-known species is the *flying gurnard,* so-called because of its huge, winglike fins.

GUSTAV'US I (GUSTAVUS VASA) (1496-1560). The first successful uprisings of the Swedish people against the yoke of Danish oppression were led by the heroic Gustavus Vasa, who was elected king in 1523 in gratitude for his rout of the Danes. He had served in the first struggles against Denmark, and for this he was imprisoned by the Danes at Jutland. After more than a year, he escaped to Sweden and roused his countrymen against the enemy, finally driving the Danes out. During his reign, he established the Protestant religion in Sweden, increased the culture of his people, and promoted commerce and trade. See SWEDEN.

GUSTAVUS II (GUSTAVUS ADOLPHUS) (1594-1632). A champion of Protestantism and a great military hero, Gustavus II (or Gustavus Adolphus as he was known) was the greatest king in the history of Sweden. In times of peace he encouraged trade and commerce and helped to make his people prosperous; in times of war he showed his genius as a commander and brought glory to his country. When he ascended the throne as a boy of seventeen, Sweden was by no means one of the great powers; but when he died, Sweden was recognized as one of the really important kingdoms of Northern Europe.

Early in his reign, Sweden was engaged in wars with Poland, Denmark, and Russia. First Gustavus Adolphus turned his attention to the Danes and recovered several Baltic provinces from them; next he forced Russia to relinquish territory; then he turned to Poland and, after a nine years' war, concluded a peace greatly in his favor, Livonia being recognized as belonging to Sweden. These exploits won him the title "Lion of the North."

Gustavus was now free to take part in the Thirty Years' War raging in Germany. A Protestant himself, he championed the cause of the oppressed Protestants in Germany. At the Battle of Breitenfeld in September, 1631, he routed the Catholic army under Tilly. In the great Battle of Lützen in November of the next year, the Swedish army decisively defeated an army under Wallenstein. But Gustavus Adolphus lost his life in the battle. See THIRTY YEARS' WAR.

GUSTAVUS IV (GUSTAVUS ADOLPHUS) (1778-1837). This Swedish king, son of Gustavus III, succeeded his father in 1792, at the age of fourteen. Taking over personal control of the kingdom, in 1800; he adopted a tragic policy of opposing France, for he had inherited his father's dislike of the French Revolution. Gustavus carried his hatred of Napoleon to such an extreme that he involved Sweden in a war with Russia, then allied with France. The result was a decisive Russian victory over the Swedish army in Finland, and the loss of that province to Russia, in 1808. Then the Swedish people forced Gustavus to abdicate. He went into exile and died in Switzerland in 1837. His uncle, the Duke of Sudermania, succeeded him in 1809 as Charles XIII. See NAPOLEON I; SWEDEN.

GUSTAVUS V (OSCAR GUSTAF ADOLF) (1858-1950). The son of Oscar II, Gustavus V ascended the throne of Sweden in 1907. As crown prince he had served as vice-regent on occasions when his father was unable to act and also had excellent training for the kingship through education and travel. His reign witnessed a steady growth of democracy in Sweden, which became one of the most economically sound nations in the world. Under Gustavus, Sweden pursued a policy of neutrality in World Wars I and II.

GUTENBERG, *goo'ten bairk,* JOHANNES (about 1397-1468). These very pages, and all our modern printed books, owe their existence to Johannes Gutenberg, the first European to use movable type in printing. Without this device, we might be reading from scrolls painstakingly inscribed by scholars; or, more likely, most of us would not be reading at all, for the world's greatest debt to the inventor of printing is that he made possible the universal distribution of the printed page, which was followed by the spread of literacy.

Gutenberg was born at Mainz, Germany, of noble but not wealthy parentage. His real name was Johann Henne Gensfleisch, but apart from his invention, little is known of his life. His family were forced to leave Mainz and settled in Strasbourg. He may have invented his printing press there, but later he returned to Mainz and persuaded Johann Fust, or Faust, a money lender, to pay for the building of a press. But Gutenberg was unable to pay for the machine, so Fust took it over and dissolved their partnership. Then Fust and his son-in-law, Peter Schöffer, went on with the business.

A Hollander named Koster has also been credited with the invention, but investigation has proved Gutenberg's claims. It has been difficult to identify Gutenberg's work because he put no name on his books; but a number of volumes believed to be his are still in existence.

Gutenberg himself was, like many geni-

Poſt hec reuertar et reedifica=
iacl'in dauid qđ decidit ⁊ diru=
edĩficabo:⁊ erigam illud: ut
ceteri hominū dn̄m ⁊ omnes
uper quas inuocatū ē nomen

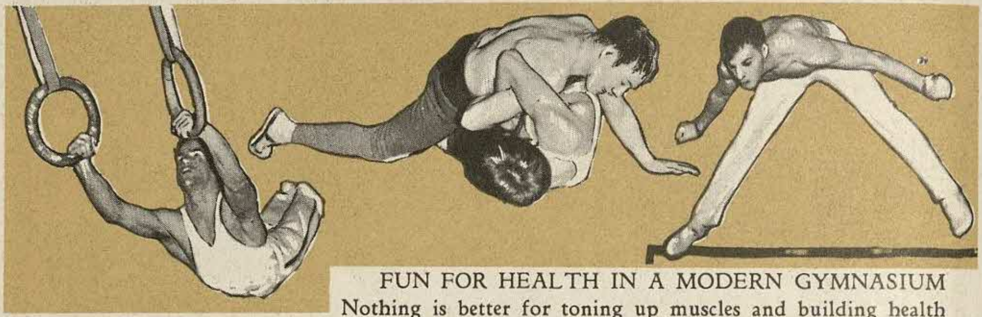
PRINTING GIVES WINGS TO KNOWLEDGE—THE DARK AGES END
In the fifteenth century, Johannes Gutenberg invented the process of printing with movable type; gave the Renaissance great impetus. Inset, type of the first Gutenberg Bible.

uses, a financial failure, and he lived the last years of his life on a pension given him by the Archbishop Adolph. A great many monuments have been erected in his honor, perhaps the best known of which is the Thorwaldsen statue at Mainz. See PRINTING.

GUT′TA-PER′CHA. Milky sap from a Malayan evergreen tree hardens into this well-known article of commerce. Originally the juice was obtained by felling the large trees, cutting away rings of the bark, and collecting the juice and concentrating it by evaporation. Because of this practice, the gutta-percha trees in some parts of the Malay Peninsula have become practically exterminated. The juice is now obtained by making incisions which permit the juice to be obtained without killing the tree.

The crude material is gray or reddish in color, but when purified has a natural-brown color. It does not adhere readily to other substances, but its cohesion is very great. It is a solid, horny substance in ordinary temperatures, but when heated it can be rolled into sheets or molded into form. It can be burned when ignited at a sufficiently high temperature. It is insoluble in water, partly soluble in alcohol, but completely soluble in chloroform, turpentine, bisulphide of carbon, or naphtha.

Gutta-percha is particularly valuable as an electric insulator and is used extensively for the covering of wires. In addition, it has various uses, as for golf balls and in the making of casts. It was formerly the only material with which ocean cables could be insulated, but in this and many other uses is now being superseded by rubber. Its chief difference from rubber is that it is not elastic.



FUN FOR HEALTH IN A MODERN GYMNASIUM

Nothing is better for toning up muscles and building health than controlled gymnasium exercise. Left, a whirl on the flying rings. Center, wrestling. Right, horizontal bar work.

GYMNASIUM, *jim na'ze um.* Modern life, with its speed, its worries, and its constant hustle and bustle, requires men and women who are strong, alert, and keen. To equip people fully for this modern age is the purpose of the gymnasium, today an important part of every up-to-date school and youth organization. In addition to the training of muscles and co-ordination of eye, head, hands, and feet, the gymnasium is also a source of amusement and entertainment, where play and sport are encouraged and unhampered.

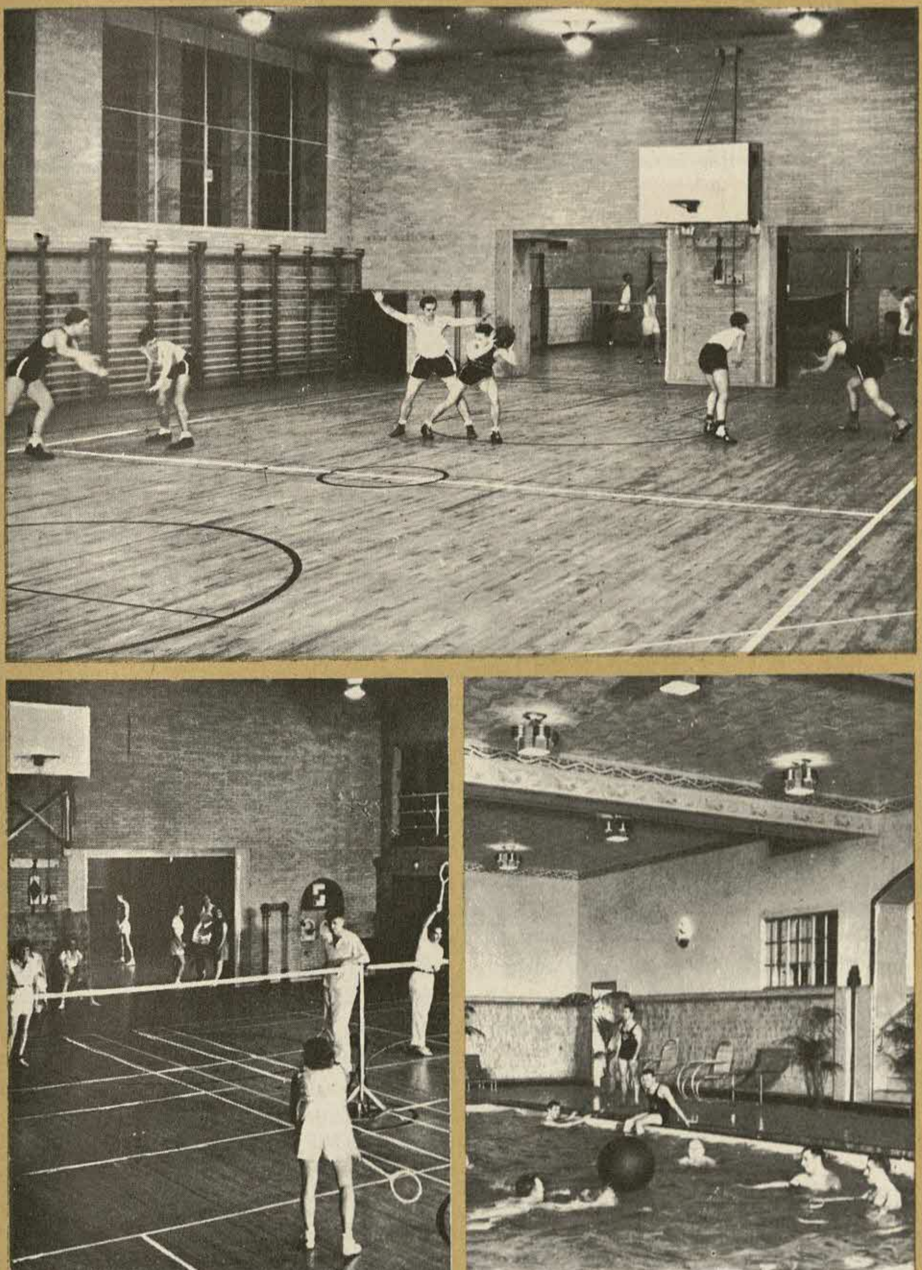
The Greeks long ago learned the necessity of having strong bodies, and provided gymnasiums for this purpose. We have not only borrowed their ways and even the name *gymnasium,* but have improved upon their methods, so that today there is a great variety of wood, leather, and metal equipment for all types of exercise and games.

In every well-organized gymnasium will be found horizontal bars, which permit the training of arm, shoulder, and abdominal muscles; flying rings, which teach co-ordination; pulleys, for exercising the chest and other muscles of the upper part of the body; ropes, for climbing; ladders, for a variety of special exercises; parallel bars, horses, dumbbells and Indian clubs; medicine balls; wrestling mats and boxing rings; courts for basketball, tennis, badminton, volley ball, squash, and handball; and pools for swimming. Lockers, shower rooms, and steam and massage chambers are usually part of the equipment in an up-to-date gymnasium.

In schools and other organizations, regular gymnasium classes are held, in which the various forms of exercise and use of equipment are taught. Classes also are held for men and women, and there are gymnasiums equipped with special apparatus for corrective exercises. Outdoor gymnasiums also are provided on playgrounds where children congregate, and trained instructors are usually present to supervise the play and exercise.

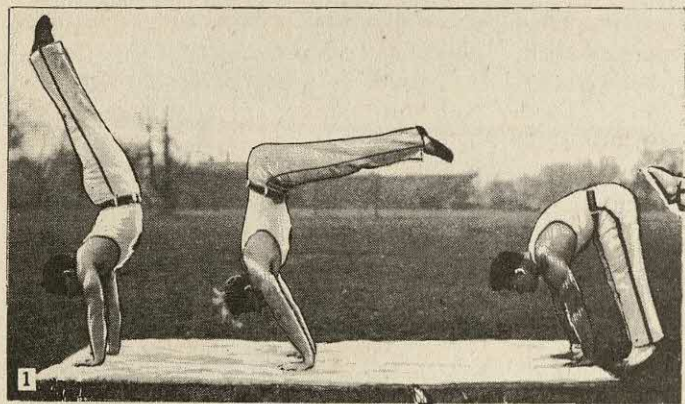
Although equipment can be purchased in sporting-goods houses, some of the apparatus can be made cheaply at home. A serviceable horizontal bar can be had by placing a steel or strong wooden bar between two trees, or by erecting two staunch uprights, securely braced by wires. By boring holes in the braces, the bar can be raised or lowered. Parallel bars may be made by placing four posts in the ground or on a strong base in the form of a rectangle, and stretching the parallel bars over them. Care should be taken that the supports are firm, and that the bars are bolted securely to the uprights.

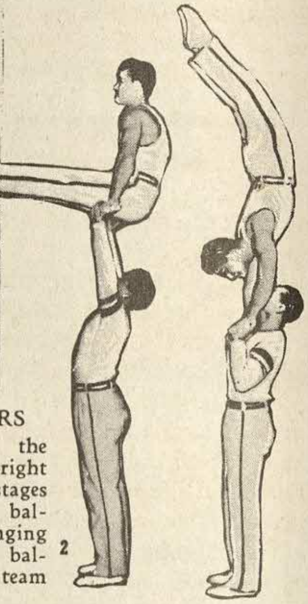
Half of a tree trunk, split lengthwise for a distance of five or six feet, will serve as

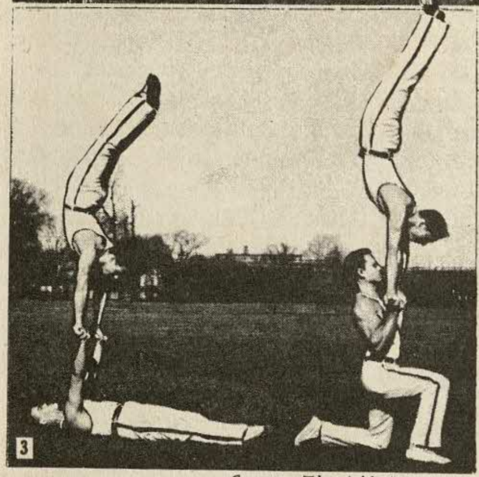


Courtesy Lawson Y.M.C.A., Chicago

THE "BATTLEFIELD" OF FRIENDLY ENEMIES OF SPORT
The "gym" means thrills in every sport, from basket ball to gymnastics.







BODY BUILDERS
Gymnastics train the muscles in the right way. (1) Three stages in reaching a hand balance. (2) Swinging into a team hand balance. (3) Up! A team in action.

Courtesy The Athletic Journal

a horse. Hand holds should be placed in the center, and the body should be placed on adjustable uprights. Pulleys can be made by attaching two pulley blocks to a wall at the same height, stringing ropes through them. At the bottom attach stones or other heavy objects of the same weight; at the other end, handles should be secured. See ATHLETICS; GYMNASTICS.

GYMNASTICS, *jim nas'tiks.* Whirling through the air on the flying rings, swinging dumbbells and Indian clubs, lifting pulleys and throwing the medicine ball—all these and more are included in the form of exercise known as gymnastics. There are many forms of gymnastic exercises, performed with the equipment in a gymnasium, and all are designed to develop the body generally, and to strengthen specific muscles.

In any system of gymnastics, the aim is to provide an all-around development of muscles, so that the body is well proportioned. A person partaking in gymnastics, however, should remember that harm is done by exercising too violently. It is sensible to begin the exercises by taking only light workouts, gradually increasing the time and the strain on the muscles, so that no injury is caused.

Competition in gymnastics often is held between college teams and athletic clubs. Points are awarded for skill and form for performances on the parallel bars, horses, flying rings, Indian clubs, and tumbling. See GYMNASIUM.

GYMNOSPERMS, *jim'no spurmz.* Pine trees and all their cone-bearing relatives differ from most other plants in having no seed cases. That is, their seeds are naked, or exposed. It is easy to discover these naked seeds between the scales of a pine cone, when the scales have separated to let the ripened seeds escape. All plants having such exposed seeds are grouped by botanists into one great class and are called *gymnosperms,* which means *naked seeds.*

There are only about 450 species belonging to this class, as compared with about

140,000 *angiosperms,* but the gymnosperms are all trees or shrubs, and many of them are most useful and valuable. See BOTANY; CONIFERAE.

GYPSIES, *jip′siz.* His gay romantic songs, strange dances, and his wandering life have made the gypsy an exciting and mysterious character to people of all ages and races.

Living in wandering tribes, gypsies are common throughout Europe, North America, Asia, and Africa, but there is no reliable information as to their present numbers. Although their origin is unknown, they seem to have come originally from India. Many thousands migrated from Asia to Europe in the fifteenth century. The gypsies call themselves *Romani.*

These people work at various odd jobs or for short periods of time to support themselves, but do not take up any fixed occupation. Horse trading has been a favorite occupation. The women make and sell baskets and other trinkets and "tell fortunes" at fairs and other celebrations. Gypsies have not been affected by modern inventions and progress. Even though they live among peoples of different habits and customs, they still cling to the culture of their ancestors and even retain their physical characteristics. This fact has puzzled scientists, since there is very little or no bond among the various tribes. Customs and traditions are passed down by the elders of the tribe, and the old gypsy civilization survives.

Gypsies marry only their own people. Their common language is *Romany.* They usually profess the religion most common in the country where they live, but in a superficial way. With strong bodies and dark skins, the gypsies are excellent physical specimens. Their hair is generally deep black, and they have very white teeth.

GYPSUM, *jip′sum.* The light, fireproof tile blocks used in modern buildings are made from gypsum, which chemically is hydrous sulphate of lime, or calcium sulphate. That is, it is composed of water, sulphuric acid, and lime. When it is reduced to a powder by heating, it is called *plaster of Paris.*

Gypsum is a soft whitish mineral of wide distribution. There are large deposits in Nova Scotia and New Brunswick and in several states of the Union. Gypsum is found also as a white, opaque stone called *alabaster,* in transparent crystallized form as *selenite,* or as a fibrous mineral, *satin spar,* which has a pearly opalescence when polished. It occurs in sedimentary formations. New supplies of gypsum are constantly being formed by chemical reactions in nature.

Gypsum has long been used as a fertilizer, particularly in reclaiming the black alkali soils of the Pacific coast, but its principal use is in building construction, either in the form of plaster or as tile blocks. See ALABASTER.

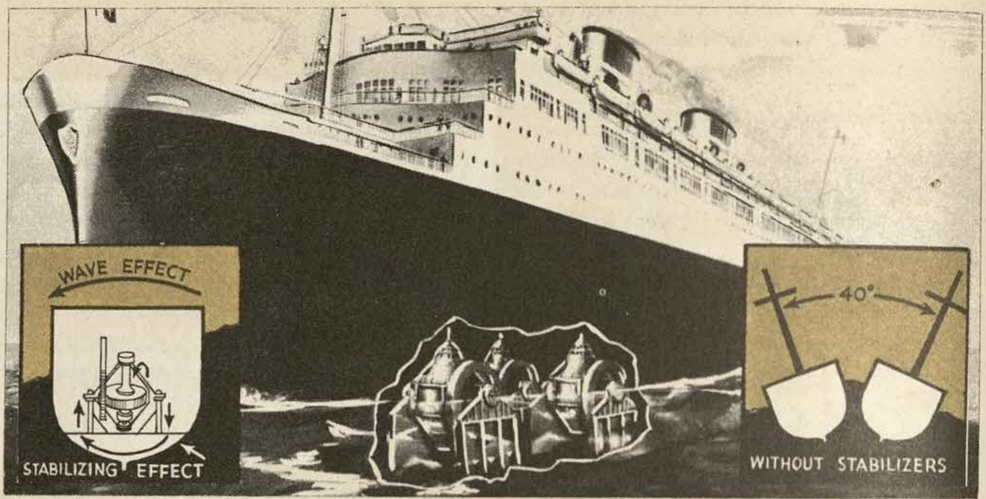
GYPSY MOTH. This moth, which was introduced from Europe into the United States near Boston by accident in 1869, became established in the New England states, where it caused immense damage by eating the foliage of forest, shade, and fruit trees.

The female moth is white with dark markings. The wing expanse is about two inches, and though the wings are well developed, the female does not fly. The male is brown with yellowish markings. It flies freely during the day.

The gypsy moth passes the winter in the egg stage, the caterpillars hatching in the spring. The full-grown caterpillars are from two to three inches long and nearly as large as a lead pencil. They are hairy and dark brown in color. After they are about three fourths grown, the caterpillars feed largely at night, coming down the trunks of the trees and hiding in masses during the daytime.

When full-grown, the caterpillars make flimsy cocoons on the trunk of the tree or on the underside of some limb. Here they pupate, and in from one to three weeks, or during July and August, the moths emerge.

GYRO-COMPASS. The most important recent development in navigation is the



Courtesy Popular Mechanics

A HUGE SPINNING "TOP" KEEPS A LINER ON AN EVEN KEEL

Like a boy's top, the gyroscopic stabilizers now used in some great vessels maintain a constant level so long as they spin. Mounted in a ship, they keep it steady (center). Left, its effect. Right, unstabilized ship in heavy seas.

gyro-compass, an instrument which operates on the principle of the gyroscope. Its two distinct advantages are that it always points to true geographic north, doing away with the necessity of computing "compass deviation," and is entirely free from magnetic disturbances on the ship (see COMPASS). It is in use on most modern ocean liners and merchant vessels, as well as being standard equipment on United States naval vessels.

The gyro-compass has as its "heart" a rapidly spinning rotor, driven by a three-phase alternating current. It rotates at speeds varying from 6,000 to 21,000 revolutions per minute. The compass is so suspended that its axis is automatically placed in the direction of the geographical meridian, and the direction of the ship is read from a compass card similar to that on an ordinary mariner's compass.

The master gyro-compass is electrically connected to various "repeating compasses" located on the bridge, in the engine room, and elsewhere about the ship, so that the identical compass readings appear on all compasses at the same time. The mechanism is partially floated in mercury, which is counterbalanced by compensating weights. A metal shell tightly encloses the entire mechanism.

GYROSCOPE, *ji'ro skope*. The principle of the gyroscope may be illustrated by a simple example. An iron hoop made of a heavy round wire, if allowed to stand upright, will immediately fall. A top placed in an upright position will also fall. Either of these may be made to remain in an upright position, the top by spinning, the hoop by rolling. A body revolving quickly is able to keep its axis, or a line running through the center of the hoop or top, always in the same position. The top may wander about on the floor, but remains upright. The hoop rolls along the ground, but remains upright.

Large wheels with heavy rims revolving at high speed resist strongly attempts to cause them to change the position of their axes. Wheels such as these, when used on engines, are of great assistance in keeping a ship in stable equilibrium during a storm at sea. Single-rail cars are operated under the control of such wheels. The term *gyroscope* is applied to one of these swiftly revolving wheels. Gyroscopes are used in a variety of ways in delicate instruments and in machines held in equilibrium.

H◆ The ancestor of *H,* the eighth letter of the alphabet, had the two upright lines as in our letter, but they were joined by two slanting lines, like this 𐤇. This was the ancient Phoenician form. The early Greeks used a form like this ⊟ or this Ħ for their letter *eta*. The Romans adopted the latter form and gave it the present sound. In English it is called an *aspirate* because, when it is followed by a vowel, the sound is produced only by the breath.

HABEAS CORPUS, *ha'be as k̇or'pus.* In law, the most important writ that can be issued by a court is that of habeas corpus, for it provides one of the bulwarks of individual liberty. Having for many centuries been employed to prevent illegal restraint upon personal freedom, no matter by what authority imposed, it is frequently referred to as the "great writ of liberty." The term is a Latin phrase which, literally interpreted, means, "You may have the body;" or, "that you have the body."

A writ of habeas corpus is a formal order by a judge on the bench commanding law officers to bring before the court a person who is held a prisoner and to show cause why that person is deprived of his liberty. It is returnable "forthwith," which means within twenty-four hours—sooner, if possible. The Constitution of the United States declares: "The privilege of the writ of habeas corpus shall not be suspended, unless when in cases of rebellion or invasion the public safety may require it" (Art. I, Sec. 9).

HAB'IT. We eat easily, walk easily, talk easily, do anything easily that we have done many times. Our actions in such cases are *habits*. Psychologists tell us that all our actions are due to the brain processes which connect the perceptions of our nervous system with the activities of our muscular system. In any given brain process, certain of the billions of our brain cells, called *neurones,* act together, the activity proceeding from one neurone to another as if along a definite path.

The first time we perform an action, there is some difficulty attached to it, because a new path is being established. A repetition of the action is easier, because it finds and follows the path, at the same time making future repetitions more easy by marking the path more deeply.

If we repeat the action often enough, it becomes practically automatic. That is, it can take place without our conscious mind doing anything more than to start it—and sometimes not even that is necessary. As a habit grows, it generally takes a smoother and smoother path, as we eliminate unnecessary motions. Thus, the first time we try to skate we are clumsy about it, but the oftener we do it the easier it gets.

Putting Habit to Good Use. If we wish, we can put our knowledge of the psychology of habit to work for us. Suppose we find it difficult to get up in the morning when we are called. Bed seems to us the most attractive place in the world at that hour, and, lying half awake, we have a mental conflict as to whether to respond or not, or else we drop back to sleep. If we look forward to a whole lifetime of daily dragging ourselves from bed, the prospect is dismal.

Now, suppose that we just make use of the psychological laws of habit. If we make up our minds that tomorrow we will jump out the instant we are called, without stopping to think, we shall probably be able to do it. And then, having done it once, we shall find it easier the second time.

Using habit constructively in this way is exactly the same sort of thing as practicing baseball or football. Every boy knows that the oftener he plays ball the better player he becomes. Practice is merely the establishing of a habit. It is much easier for a famous baseball player to make his fifty-first home run of a season than to make his first, because by the end of the summer home-run hitting is a habit.

HADDOCK, *had'uk*. An important item in commercial fisheries, this food fish is much like the cod, but has a smaller mouth and a black line along the side. The foremost fin on the haddock's back is also much longer than that in the cod. The food habits of codfish and haddock are similar, though haddock tend to feed together in more compact schools than cod and will take a bait lying on the bottom, while, in most cases, codfish have the interesting habit of taking the bait only when it is raised a bit above the sea floor (see COD).

Haddock are much smaller than codfish, rarely weighing seventeen pounds, and averaging between two and three pounds. They keep well on ice and are commonly found for sale in markets.

These fish are found in deep-sea water from Virginia north to the Strait of Belle Isle, between Quebec and Newfoundland, and from Iceland to France, being particularly common around the British Isles. On the American coast, the eggs are laid from April to June, a fish weighing nine and one-half pounds having been known to produce nearly 2,000,000 floating eggs.

Haddock cured by being smoked in peat smoke are known as *finnan haddie*. The method was first used in Findon, Scotland, and this accounts for the name "finnan."

HADES, *ha'deez*. The earliest Greeks called the ruler of the lower world, Hades. This was later changed to Pluto, and the term Hades has since been applied to the region itself. Contrary to popular opinion, Hades was not a place to which only the wicked went after death, but a region for all the dead, good or bad.

HADJ, or HAJJ, *haj*. It is the consuming desire of all Mohammedans to make the "greater pilgrimage" to the sacred cube-shaped Kaaba at Mecca; that is, to go in the twelfth month of the Mohammedan year, between the eighth and the tenth. When the faithful have made this pilgrimage, called the hadj, they may include "hadji" or "hajji" as part of their names.

GOOD EMPEROR
Hadrian was one Roman ruler who proved honest and benevolent. His ancient tomb (top) is now a show place in Rome.

HA'DRIAN (76-138). One of the most efficient and statesmanlike of all the Roman emperors was Hadrian. It is during his rule that Rome is considered to have reached the height of her power.

He was born in Spain; but at an early age, after the death of his father, he came under the guardianship of his kinsman, the Emperor Trajan. Under Trajan he received excellent military and administrative experience and proved himself so capable that he was himself acclaimed as emperor when Trajan died.

Several years of his reign were spent in traveling about the empire—in Gaul, Germany, Britain, Spain, Greece, and the Asiatic provinces. He decided that the eastern boundaries of the empire were too far distant to be defended and so returned to the Parthians all Roman territory east of the Euphrates River. In Britain he built the famed Hadrian Wall, which extended for seventy-three miles across the northern boundary; remains of this wall may still be seen. In Athens he built the well-known Hadrian's Arch. At Rome he built for himself Hadrian's Tomb, a massive structure which was later the nucleus of a fortification now known as the Castle Sant' Angelo. Hadrian's Villa, a large country estate, was near Tivoli; it was the site of the Hadrian Baths.

Hadrian kept the empire at peace, with the exception of one rebellion of the Jews. He enforced humane treatment of the slaves, improved the postal service, rebuilt Jerusalem, constructed public buildings, was tolerant of the Christians, worked out a fixed code of laws, and took steps to make taxation more just than it had been before. Truly he deserves to be listed among the "five good emperors." See Rome, History of.

HAEMOGLOBIN, *hem o glo'bin.* See Hemoglobin.

HAGUE, The. This fine old city, seat of government of the Netherlands, became widely known as the international peace center of the world. One of its handsomest structures is the Peace Palace, the gift of Andrew Carnegie, which has housed the Court of International Arbitration and the Permanent Court of International Justice (World Court).

Although only three miles from the North Sea, the city has no port, but is the railway center for all of Holland. At The

HALL OF PEACE

The world knows The Hague as the seat of the Palace of Peace, where the World Court met. The Palace was built by Andrew Carnegie, Scottish-American steel manufacturer, who donated $1,500,000 for its construction. It is an imposing structure, befitting its Dutch setting. Many disputes have been settled within its walls.

Hague are held the sessions of the national Parliament.

The city has a population of about 607,000. The familiar Dutch canals, crossing the broad, shaded streets; the well-kept parks; and the many fine public buildings make Holland's legislative capital one of the most attractive cities of Europe. Interesting to art lovers is the famous art gallery, containing paintings by such masters as Rembrandt and Van Dyck.

During the Dark Ages, The Hague was a kind of hunting camp for nobles. In 1250 it became a princes' stronghold; later, the seat of the States-General; and finally, the Dutch capital. Since then The Hague has been the scene of many treaty and peace conferences. The Triple Alliance of 1717 between England, France, and Holland came into being in this city, and the International Peace Conference of 1899 was held there.

The Hague was occupied by the Germans in May, 1940, during World War II. The government fled to England, returning to the liberated capital in May, 1945.

HAGUE PEACE CONFERENCE. See PEACE CONFERENCE, INTERNATIONAL.

HAIL. Even the smallest hailstones, falling with tremendous force, frequently do great damage to leafy crops like tobacco. Large hailstones, sometimes several inches in circumference, hit the earth with the effect of bursting shrapnel, causing costly glass breakage in buildings and vehicles exposed to the storm. Large commercial greenhouses, built of steel and glass, are particularly vulnerable to hail damage. Hail insurance is available to cover this risk.

Hail consists of pellets, balls, or irregular masses of clear and cloudy ice, usually arranged in concentric layers about a core. A crystalline structure sometimes gives to hailstones a rough exterior, but this roughness may be lost in the fall through warm air or before the hailstones can be examined. However, many beautiful hailstones have been found.

Hail forms usually at a height of three to seven miles, and seldom occurs except in hot weather. Within any extensive region, the hail is likely to be most severe in the hotter, drier portions. Thus, on the Great Plains the western part is more subject to hail than the eastern portion, because of the stronger convection (air currents) where weather is hotter.

There are several theories to explain the formation of hail, but the most plausible one is that hot air, being forced rapidly to great heights, not only cools by expansion to a very low temperature, but also rises so fast that raindrops are carried up to where the air gets very cold. There, in coming in contact with snow, which is the form of condensation at such temperatures, pellets of cloudy ice are formed.

These tiny hailstones may then oscillate back and forth or up and down in the cloud, in varying degrees under the influence of the rising air, and receive layers of clear and cloudy ice as they alternate between groups of raindrops and groups of snowflakes. Finally, when their size and weight become so large that they can fall out of the vigorous up-draft, they descend to the ground.

HAIR. Primeval man was a hairy creature, like the hairy Ainu of Northern Japan, because, lacking textiles, he required hair to keep him warm. The primary function of hair is to maintain the heat of the body; how well it serves this purpose is emphasized by the warmth of fur garments.

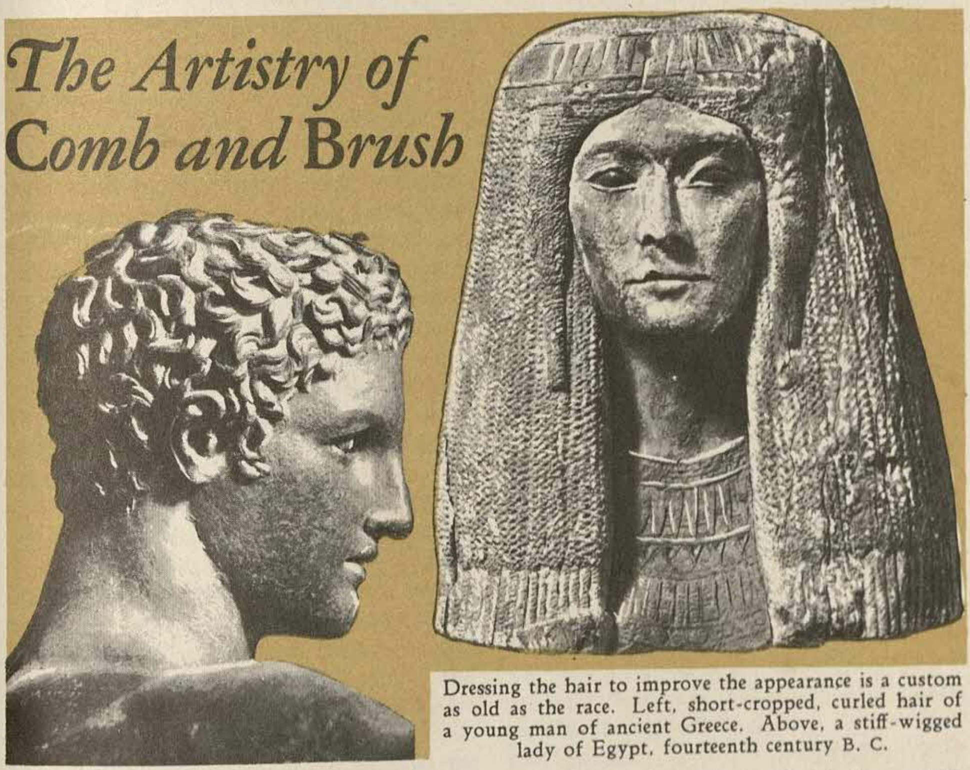
Hair, like the nails, is developed from the outer layer of our skin, the *epidermis,* which dips down into the deeper skin structure, forming pits, or *hair follicles,* in which the hairs grow. Each hair has a *shaft* and a *root,* the latter being cupped to fit over a *vascular papilla* in the skin, whence it obtains its blood supply.

Malpighian cells, at the base of the hair follicles, continually multiply, and these new cells, which are scaly or hornlike, are pushed upward toward the surface and transformed into hairs upon whose outer surface the cells are arranged in overlapping fashion. In some animals the external surface of the hairs is so rough that they can be felted together by pressure, to form rugs or material for hats.

Next to the outer surface comes a layer of pigmented *fibrous structure,* and the innermost part of the shaft is the colored *medulla,* which is composed of angular-shaped cells between which there are air bubbles in varying numbers. When the medulla is largely displaced by air, or secretion becomes deficient, the shaft turns white. When hairs are shed, new ones take their places in the same follicles, the life of a hair being from two to four years.

Commercially the hair of human beings and animals is in constant demand for the manufacture of fabrics, mattresses, cushions, upholstery, etc. Domesticated sheep's wool, a modified form of hair, is a fiber of world-wide importance, second only to cotton fiber. Angora goats, camels, and alpacas also furnish commercial wool. Horsehair, pigs' bristles, and the hair of various fur-bearing animals are made into a wide variety of brushes, violin bowstrings, tapestries, and garments.

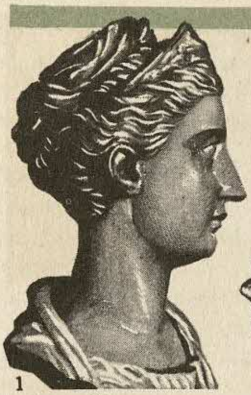
The Artistry of Comb and Brush



Dressing the hair to improve the appearance is a custom as old as the race. Left, short-cropped, curled hair of a young man of ancient Greece. Above, a stiff-wigged lady of Egypt, fourteenth century B. C.

HAIRDRESSING. To make oneself more attractive to other people has always been the fundamental cause for the age-old custom of dressing the hair. Brushing, combing, cutting, dyeing, curling, and designing hair is as ancient as dress, and is as common among savages as it is in the crowded metropolitan centers of Europe and America. Thousands of dollars are spent daily in barber shops and beauty parlors for beautifying the hair, and its care and treatment have developed into a large industry.

The earliest civilized people paid close attention to the care of the hair. The Assyrians, Babylonians, Egyptians, and Persians curled their hair and beards, and in some cases wore false beards and wigs. The Greeks had an elaborate headdress, and although the men began to cut their



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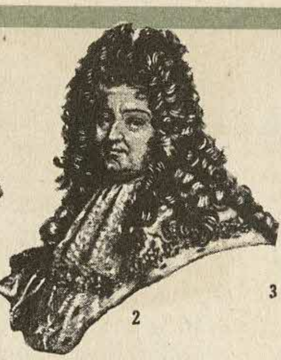

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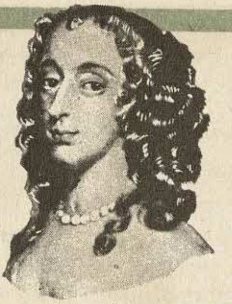

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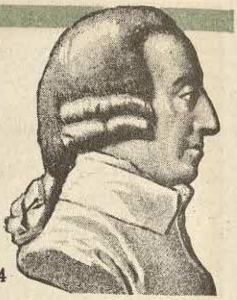

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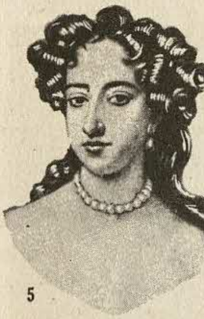

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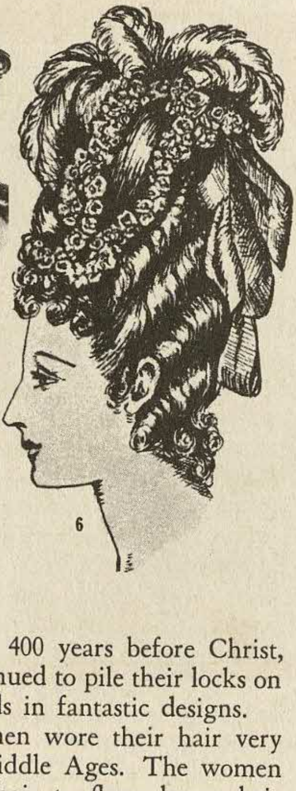

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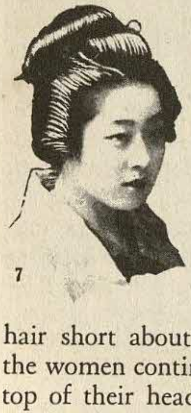

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(6) Courtesy Modern Beauty Shop Magazine

CURLS AND RINGLETS IN HISTORY

(1) The coiffure of ancient Rome—Hadrian's wife. (2) Louis XIV of France, paragon of style in the days when men vied with women in hairdressing. (3) Mary, mother of England's William III. (4) Eighteenth-century wig, worn by Adam Smith. (5) Mary, Princess of Orange, with a late eighteenth-century hairdress. (6) Elaborate coiffure of Marie Antoinette. (7) Traditional Japanese pompadour.

hair short about 400 years before Christ, the women continued to pile their locks on top of their heads in fantastic designs.

Men and women wore their hair very simply in the Middle Ages. The women permitted their hair to flow down their backs, while men either let it grow long, or bobbed it. At the time of the Renaissance, however, fancy hair styles came into vogue along with the elaborate costumes, and men wore pompadours and curled their beards, while women curled and crimped their hair.

During the time of Louis XIV of France, hairdressing began to assume the fantastic designs of the costumes. King Louis had long locks, and to imitate him, the members of his court wore curled wigs. This custom spread throughout Europe and existed until about the middle of the eighteenth century. The women continued to wear their hair long, but at the end of the seventeenth century, they adopted more elaborate designs. By the end of the eighteenth century, women were wearing their hair in a tower-like arrangement. These lofty wigs were held up by wire, and were ornamented with jewels, flowers, and other decorations.

The flamboyant styles of the eighteenth century soon passed out of the picture in the beginning of the nineteenth century, and men began to wear their hair short, while women again let their hair fall in ringlets. Later, they arranged it on the top of their heads in the form of a roll, or waterfall.

During the third decade of the twentieth century, women's style of hairdressing underwent a radical change, and short hair, in the form of bobs, came into vogue. Some women even wore their hair cut in the manner of men's. Then a reaction set in, and long hair began to come back. The bob, with variations, held its own, however. Modern women wear any style that suits

CONTINENTAL TASTES IN HAIRDRESSING

In every land, stylish people contrive elaborate coiffures. Left, a high-caste Hindu woman's jeweled tresses. Center, the African shaved vogue. Right, Hopi Indian allure.

their taste—long hair, plain or waved or with braided designs, long bobs with swirls and curls, short, plain haircuts, bobbed hair in the manner of medieval page boys, and so on. For a time the marcel wave, achieved with curling irons, was very popular, but it has largely given way to the permanent wave, which is set by hand.

Men's manner of dressing hair has become standardized. Beards, however, are seldom worn, although moustaches are common.

HAIRLESS DOG. The pocket-size Chihuahua is an example of the hairless dog, and many varieties of this strange creature are found throughout the world. In India, a half-wild species is widely used in hunting, and the Chinese raise a small species which is used as a food for festive occasions. Examples were found in Mexico as early as the Spanish conquest. In the United States these dogs are sometimes seen in trained troupes on the vaudeville stage.

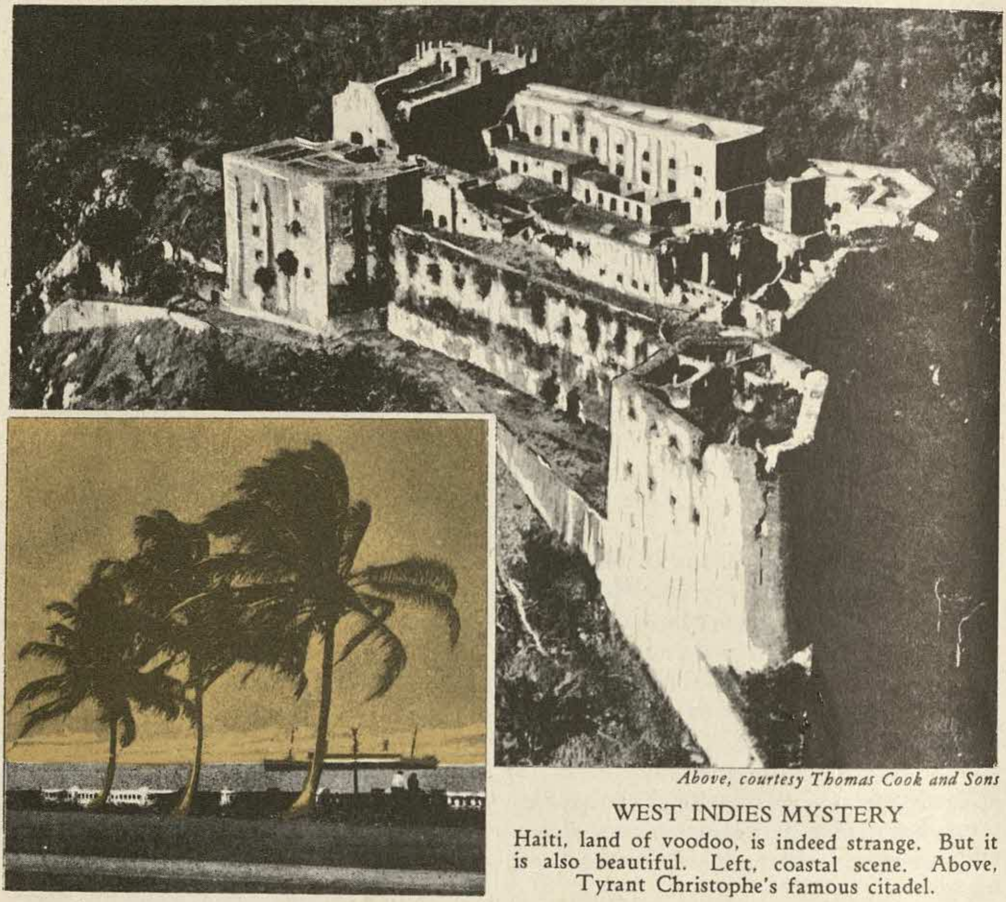
HAITI, *ha'te.* Southeast of Cuba is the tropical island of Haiti, a country composed of two Negro republics. The Republic of Haiti occupies the western third of the island. The eastern two-thirds consists of the Dominican Republic (see DOMINICAN REPUBLIC).

The Republic of Haiti has a varied climate. The lowlands along the coast are very hot in summer, but the climate in the high regions is springlike. The soil is fertile, and the country is chiefly agricultural. Coffee and sugar cane are the most important crops, much of the sugar cane being manufactured into molasses and rum. Other products are cotton, cacao beans, and tropical fruits. Extensive forests supply mahogany, logwood, and cabinet woods. Little mining is carried on, although there are deposits of gold, silver, iron, tin, copper, and nickel.

The people are mostly Negroes or mulattoes. The population is estimated at 3,500,000, of whom about 3,000 are white. The capital is Port-au-Prince, with a population of about 200,000.

French is the national language of Haiti, and the government is patterned after that of France. The constitution of the republic provides for a Chamber of Deputies and a Senate. These form the National Assembly, which elects the President for a term of six years.

Haiti became known to Europeans when Columbus discovered it in 1492. In 1496 the first permanent Spanish settlement was established. Although Haiti at first belonged to Spain, in the seventeenth century English and French traders used the harbors, and the French settled on the western



Above, courtesy Thomas Cook and Sons

WEST INDIES MYSTERY

Haiti, land of voodoo, is indeed strange. But it is also beautiful. Left, coastal scene. Above, Tyrant Christophe's famous citadel.

part of the island.

The French received the western portion under the Treaty of Ryswick in 1697 and developed the resources of their new province. The Negro slaves revolted successfully in 1791, under the leadership of Toussaint L'Ouverture, who became the supreme ruler of the whole island until captured by the French in 1802. Two years later an independent state, named Haiti, was established in the western portion of the island.

Haiti was for years in a constant state of upheaval, and for a time American control was necessary. Nevertheless, Haiti has made great progress.

HAKE. Several fishes related to the cod are given the name hake. The true hakes are the *silver* hake, or whiting, of the Atlantic, and the hake known on the Pacific coast from Alaska to Catalina Island, off the California coast. The *white* hake and *squirrel* hake are also related to the cod. These fish weigh from about five pounds to ten pounds each and also have considerable importance as food. They are the fish which are described as *hake* in the United States Fish and Wildlife Service reports of New England fisheries.

HALE, NATHAN (1755-1776). "I only regret that I have but one life to lose for my country." With these stirring words on his lips, Nathan Hale was hanged by the British as a spy in the Revolutionary War, but his ringing declaration of patriotism has resounded ever since in the annals of America's patriots.

A native of Coventry, Conn., Hale attended Yale College, and in 1773 secured a position teaching school in East Haddam.

"I REGRET THAT I HAVE BUT ONE LIFE TO LOSE FOR MY COUNTRY"
Thus spoke Nathan Hale as he was about to be hanged by the British as a spy. This patriotic statement has won him a permanent place in the hearts of all Americans.

When the Revolutionary War broke out, he was in New London, Conn. He heeded the call for volunteers, and was assigned to recruit men in New York. General Washington, in dire need of information concerning British movements, sent Hale to secure it. He succeeded in entering the British camps, and mapped their fortifications in New York and on Long Island; but as he was returning, he was captured and was hanged in New York City as a spy.

HALF'TONE. See PHOTO-ENGRAVING.

HAL'IBUT. Because the liver of these fish is the richest natural source of Vitamins A and D, the halibut has increased greatly in commercial importance. These vitamins are found in halibut in more concentrated form than in cod, and halibut-liver oil is now being generally prescribed for children. Halibut eggs, known as roe, are excellent food, and a large fish may produce as much as forty pounds of them.

The halibut is found in the colder, shallow waters along the coasts of the North Atlantic and North Pacific. There are important halibut banks near Seattle, Wash., Prince Rupert, B. C., Ketchikan, Alaska, and other places along the shores of North America. The adult fish resembles a flounder in that both eyes are on the upper side. To escape from its enemies, the halibut lies flat on the ocean floor; its underside is white, the upper side toning in with the sandy bed of the sea.

Halibut are among the largest of fishes, and they sometimes reach a weight of 400 pounds. One halibut liver may weigh a pound or more. Smaller specimens of these fish are considered the better food. They do not spawn until ten or twelve years of age and are not fully grown until thirty-five years old. To prevent their extinction, the United States and Canada have made a treaty which forbids halibut fishing certain months of the year.

HAL'IFAX, N. S. Situated on the slopes of a hill facing one of the finest all-year harbors in the world, is the city of Halifax, a thriving commercial and railroad center and Canada's chief Atlantic port. It is a fortified city lying on the southeast coast of the province of Nova Scotia, of which it is the capital. Its population numbers about 100,000.

The Canadian government in recent years has spent millions of dollars improving the harbor facilities. Every winter the railways bring grain, lumber, apples, and other products for shipment abroad. Fish from the Grand Banks are also exported. Halifax has a large industrial district producing iron and steel manufactures, textiles, furniture, and rope. The curing and packing of fish and meat is also an important industry, and there are large sugar and petroleum refineries.

Founded in 1749, Halifax was a British naval base in the War of 1812, and today is an important naval station. The first ocean-steamship service between North America and Europe started here in 1840. The city is the home of Dalhousie University.

HALL OF FAME. Herein are inscribed the names of America's truly great men and women who have been chosen by public nomination and approved by a committee of eminent citizens, including representatives from every state. The building, completed in 1900 and erected with funds donated by Helen Gould Shepard, is located on the campus of New York University, in the Bronx, N. Y. Provision has been made, along its 400-foot colonnade, for 150 panels, two feet by six, each to bear the name of one person.

SERIOUS THREAT TO BLACK MAGIC
This Hallowe'en pumpkin will undoubtedly be expected to frighten off all sorts of goblins after dark.

Only people born on United States soil, who have been dead for at least twenty-five years, are eligible for nomination. The original plans were to have fifty names chosen at the beginning and five more every fifth year during the ensuing century. In 1900, 252 names were submitted, but through the rule that each name must receive fifty-one votes from the board of 100 judges, only twenty-nine were chosen. Even fewer names have been chosen in the later elections.

HALLOWE'EN, *hal o een',* **or HALLOWEVEN.** When witches ride broomsticks across the sky and goblins and ghosts haunt the house near by; when the rules of behavior become quite lax, and silent, black cats stiffly arch their backs; when candle-lit pumpkins gleam in the night, and strange, eery noises fill us with fright; when parties are held, and costumes are seen—that is the night we call Hallowe'en.

The festive occasion, which occurs on the night of October 31, has its origins in ancient religious and pagan customs. The name Hallowe'en really means *Holy Eve,* so-called because All-Saints' Day occurs on November 1. But even before people believed in Christianity in some parts of the world, the night was the occasion for honoring both good and evil spirits. According to the folklore of England, the pagan Druids held a festival about this time. The festival of Pomona, goddess of fruit, also was celebrated at this time by the Romans, and the custom of serving nuts and fruit on Hallowe'en comes from this observance.

HA'LO. Sunlight passing through falling raindrops is separated into the rainbow colors. The same effect may be produced when the water is in the form of a fine cloud or mist. In similar fashion, tiny ice particles which form the very high clouds will separate the light coming from the sun or moon and form a rainbow or halo about them. Halos about the moon are seldom colored, but those seen around the sun are tinted red on the inside, shading to blue on the outer margin.

These high clouds of fine snowflakes and ice needles, which are instrumental in causing halos, usually are indicative of the approach of cyclonic storms. Hence there is a scientific basis for the common belief that halos are prophets of stormy weather.

In religious painting, the luminous halo about the head is used in connection with pictures of Christ and the saints, as a symbol of holiness.

HALOGENS, *hal'o jenz.* One of the important groups of chemical elements consists of the halogens—iodine, chlorine, fluorine, and bromine. All these elements are similar in nature, because each in compound with other substances forms a salt similar to common salt. The name means *sea-salt producer.*

DUTCH PAINTER'S MASTERPIECE

This proud gentleman is called the "Laughing Cavalier," and the portrait is the most famous of the paintings of Holland's Frans Hals.

HALS, *hahlz,* FRANS (about 1580-1666). Gay, carefree Frans Hals is famed for his outstanding paintings of everyday life among the Dutch peasants. This form of painting is known as *genre* painting, and Hals is commonly considered the father of Dutch genre painting. He wanted his pictures to show faithfully the characters and expressions of his subjects; thus all details were painted to help carry out the impression which he wished to catch. Hals excelled also as a fine portrait painter. His work was careful and exact, but nevertheless sympathetic.

Born in Antwerp, he later moved to Haarlem to spend years in study under the masters. In the opinion of many critics, Hals ranks second only to Rembrandt as Holland's greatest painter. In such pictures as *Flute Player, Hille Bobbe,* and *The Jolly Trio,* he seems to have caught the serious, yet fun-loving, spirit of the Dutch. *The Laughing Cavalier* is his best-known work.

HAM. In the modern sense of the word, ham is the cured thigh of the hog and is extremely popular as a meat.

Ham is cured in a number of ways. Modern curing methods consist of pickling it in brine, after which it is smoked to add flavor and give a preservative coat. One of the latest developments in curing hams on the farm is the use of *smoked salt,* a material which combines the two operations above into one. Each nation has its own ideas on curing hams; the packing houses, therefore, try to follow these customs in preparing hams for export. See MEAT PACKING; PORK.

HAM'BURG (in German, *ham'boork*), GERMANY. Although Hamburg lies seventy-five miles inland from the North Sea, it was, before World War II, one of the most important seaports in the world. Today it is the second largest city in Germany, with a population of 1,760,000. Situated on the north branch of the Elbe River where it is joined by the Alster, Hamburg had a tremendous trading territory, which included not only North Germany but also Poland and Silesia. It was a leading member of the Hanseatic League (which see).

Hamburg is crisscrossed by canals which are normally lined with factories and warehouses and which lead to the harbor. The city is divided into two sections by the Alster River. The older part extends along the east bank of this river, and the newer and larger part lies on the west bank. The newer section is the center of activity, and here were built broad, well-paved streets and many fine buildings, including the Exchange and the Church of St. Nicholas, which towers more than 480 feet above the city. This section also contains the University of Hamburg, great art galleries, and beautiful botanical gardens.

In addition to being a great seaport, Hamburg is also an important manufacturing city. Shipbuilding is one of the great industries, along with the production of dyes, oil, rubber, explosives, and iron and steel products. The chief imports of the city are foodstuffs, raw materials, tobacco, wine, and manufactured goods. Hamburg exports coffee, sugar, cotton, machinery, paper, and ironware.

Hamburg was the capital of the independent state of Hamburg in the German Republic. In 1934 Hitler put the states under the control of the central government. After World War II, Hamburg again became the capital of the state of Hamburg, which joined the Federal Republic of West Germany in 1949.

HAMIL'CAR BARCA (?—228 B. C.). It was during the time of Hamilcar Barca, the father of Hannibal, that stubborn Carthage, battling to resist the ambitions of the Romans, prepared the way for Hannibal's invasion. A commander of the Carthaginian army in Sicily during the First Punic War, Hamilcar resisted the Roman forces but was finally cut off from aid and had to evacuate the island. Making his way to Spain, he succeeded in conquering the southern and eastern portions, establishing a valuable colony of Carthage. This colony was to be the base for the operations of his son-in-law, Hasdrubal, and for Hannibal. Hamilcar was killed in 228 B. C. in a struggle against the Vettones. See HANNIBAL.

HAM'ILTON, ALEXANDER (1757-1804). America's treasury was empty; the country was impoverished, and the dollar was worthless when Alexander Hamilton became Secretary of the Treasury under George Washington. But, when he left that position, the country was on its way to wealth, its money was sound, and its financial position was secure. No easy task was this for the man who had left his native home to aid the struggling colonies. He had enemies abroad and at home to contend with, but he overcame them all to found a faith in the United States government that has never been impaired.

Hamilton came to America in 1773 from Nevis, an island in the West Indies, and immediately took part in the agitation against British oppression. Following his attendance at King's College (Columbia University), he joined the colonial army in 1776, and was appointed an artillery captain. Later, Washington made him his aide-de-camp, a position he held until 1781, when he left the army to study law. A year later he became a delegate from the state of New York to the Continental Congress and five years later was a delegate to the Constitutional Convention.

Hamilton advocated the adoption of the Constitution and was a staunch believer in a strong central government, being one of the founders of the Federalist party. He was directly opposed to Thomas Jefferson; and, when the two sat in the first Cabinet, there were frequent quarrels.

As Secretary of the Treasury Hamilton proposed a national bank and a mint, advocated customs and excise taxes, and urged that the nation take over the debts of the states. He succeeded in carrying out all these plans, and during his term the country became solidly entrenched economically. Hamilton left office in 1795; but three years later, when war with France threatened, he became second in command of the American army.

Hamilton incurred the anger of Aaron Burr,. who thought the prominent statesman had worked against his interests. Burr challenged him to a duel in 1804 and wounded him. Hamilton died shortly after, and Burr lived the rest of his life in disgrace. Hamilton's philosophy of government has been followed throughout the history of the nation. Some of his writings may be found in *The Federalist.* See BURR, AARON; CONSTITUTION OF THE UNITED STATES; WASHINGTON, GEORGE.

HAM'LET. For more than 300 years, the world has thrilled to *Hamlet,* the immortal tragedy by Shakespeare. Written about 1602, at the height of Shakespeare's powers, the play is bloody, but profound, abounding in wisdom and understanding of human nature. The character of Hamlet is difficult and subtle, and many of the greatest actors since Shakespeare's time have attempted to give it a new meaning.

WASHINGTON'S MONEY WIZARD
Often called the greatest Secretary of the Treasury, Alexander Hamilton took office when the country was bankrupt; left it solvent.

In the play, Hamlet is a Danish prince whose father has been slain by his brother, Claudius. The deed is revealed to Hamlet by his father's ghost, and Hamlet swears to avenge his father. He feigns madness but is kept from killing Claudius because of his own weakness. It is Hamlet's indecision to commit the dreaded act that gives rise to the play's most famous lines, the "To be, or not to be—" soliloquy.

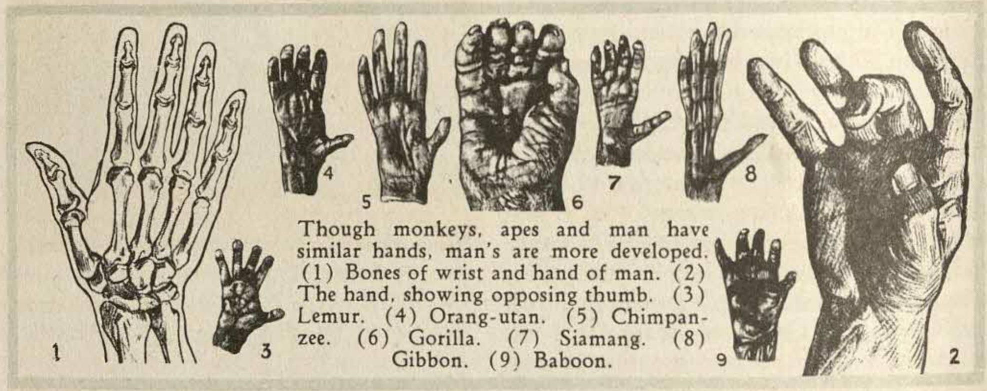
Shakespeare based his play on an old story of a Danish prince named Hamlet, who lived about 200 years before Christ. The legend is similar to the play, but varies in many of the details.

HAMPTON ROADS. See CHESAPEAKE BAY; MONITOR AND MERRIMAC.

HAN'COCK, JOHN (1737-1793). Heading the list of signatures on the Declaration of Independence is the large, firm handwriting of John Hancock, president of the Continental Congress when that historic document was signed. Behind that signature is a story of courage and conviction, for John Hancock, never a brilliant or broad-minded statesman, had everything to lose and little to gain by joining with those who wished to break away from British rule.

Born in Braintree, Mass., Hancock was a wealthy merchant. By siding with the Revolutionists, he stood a good chance of losing his fortune. With Samuel Adams, he was sought by the British in 1775, thereby helping to bring about the Battle of Lexington, which led to the American Revolution. A member of the Continental Congress from 1775 to 1780, he was president of the body for the first two years. He served again in 1785 and 1786. He was also governor of Massachusetts for twelve years.

It was because of the large hand in which he wrote his name on the Declaration of Independence, and because it was first of all the signatures, that the expression has come down to us "to sign one's John Hancock" to a paper.



Though monkeys, apes and man have similar hands, man's are more developed. (1) Bones of wrist and hand of man. (2) The hand, showing opposing thumb. (3) Lemur. (4) Orang-utan. (5) Chimpanzee. (6) Gorilla. (7) Siamang. (8) Gibbon. (9) Baboon.

HAND. If it were not for hands, our modern mechanical civilization would never have developed, for they enable man to grasp, raise, swing, or catch objects. By means of these powers of the hand, man learned to use stones as weapons and tools, and eventually to fashion them into the most convenient forms. Degree by degree, as man's mental pictures were wrought into tangible form by his hands, the simple weapon became a gun and the tool became a complex machine. Especially important to man's progress has been his possession of an opposable thumb; that is, a thumb that can be placed opposite his fingers.

The flexibility of the hands is remarkable. One can flatten them downward to support the body when crawling, and they can be curved upward in the shape of a drinking cup. By means of hands, a pencil can be grasped for writing, a sledge hammer wielded for crushing great stones, a tiny needle guided for fine sewing. They serve to dress the body, feed it, and protect it from attack. No other external parts of the body have so many varied uses.

Hands are far more versatile than the feet, which are similarly constructed. Although the hands are not as strong and cannot support as great a weight as can the feet, principally because of lack of training after birth, otherwise there is nothing which the foot can do that the hand cannot do. Outside of the ability of the fingers to grasp, the two most powerful and useful movements of the hand are called *pronation* (turning the palms face down), and *supination* (turning the palms face up). A characteristic of the hands of man and other primates is the ability to place the thumb and other fingers together in order to seize objects. In this trait lies the inventiveness of the hand.

The bony framework of the hand is made up of twenty-seven bones, including the eight *carpal* bones of the wrist. The palm is made up of five *metacarpal* bones, and in the fingers and thumb there are fourteen *phalanges.* Tendons connect the palm and fingers to the arm muscles, enabling the fingers to be moved and the thumb to have flexibility. See FOOT.

HANDEL, GEORGE FREDERICK (1685-1759). Each Christmas, countless musical groups honor the German composer, George Frederick Handel, when they present his famous oratorio, *The Messiah,* with its matchless "Hallelujah Chorus." Although unappreciated when first produced in 1742, it has steadily increased in favor.

In 1704, early in his career, Handel produced the opera *Almira,* following it with about forty others; but his fame rests chiefly on his oratorios, which include, besides his masterpiece, *Israel in Egypt, Saul,* and *Samson.* Born in Halle, Saxony, the composer studied in Berlin. He gave his first public performance at the age of twelve. He later became organist in the cathedral at Halle and also played second violin in an orchestra in Hamburg.

Handel's life from 1710 was spent mostly in England. He composed two operas at the command of Queen Anne, and was music master to the children of George I. His greatest work, *The Messiah,* was originally performed for the benefit of the Dublin Foundling Hospital. Although he became blind in 1752, he went on composing and playing in public recitals. His tomb is in Westminster Abbey.

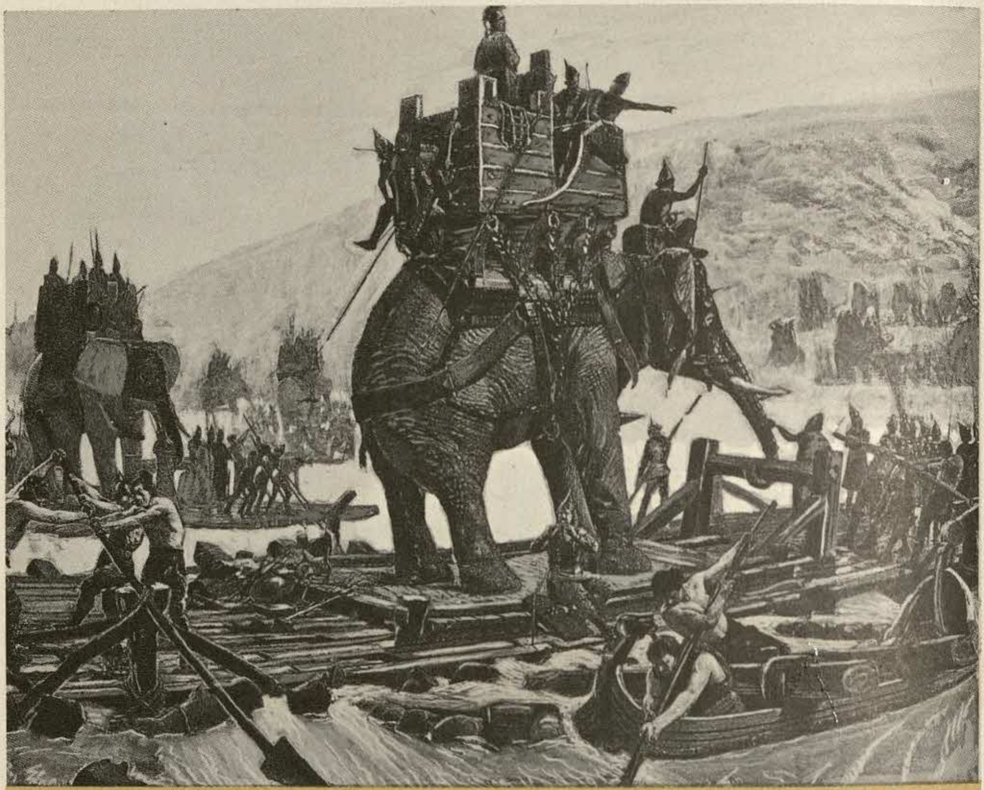
HANGING GARDENS OF BABYLON. Even though Nebuchadnezzar, mighty monarch of Babylon, showered her with all the luxuries of his kingdom, Semiramis, his queen, was unhappy. She longed for the green hills of her native land, Media, and the flat plains of the Tigris-Euphrates valley made her weary. So, to please her, Nebuchadnezzar built the famous Hanging Gardens of Babylon.

The "hanging gardens" really were not "hanging." They were actually a terraced pyramid upon which were planted trees, shrubs, and flowers. They were so remarkable that they were considered one of the Seven Wonders of the Ancient World. See SEVEN WONDERS OF THE ANCIENT WORLD.

THE MASTER OF ORATORIO
George Frederick Handel's *Messiah* is the most popular oratorio, and one of the greatest, although its composer finished it in three weeks.

HAN'NIBAL. The greatest threat to Rome in the third and second centuries B. C. was the city state of Carthage, in Africa, and the greatest Carthaginian soldier and statesman of that period was Hannibal, son of Hamilcar Barca. As a lad of nine he had sworn an oath of undying enmity to the nation across the Mediterranean. That oath he never forgot.

In 218 B. C. the Second Punic War began. The first war had ended in 241 B. C. with Rome victorious (see HAMILCAR BARCA). Determined to destroy Roman power in Italy, Hannibal invaded that country from the north. Through the Pyrenees and through Gaul he marched, subduing the



A MASTER OF STRATEGY MOVES TO THE ATTACK

Constant menace to the supremacy of ancient Rome. Hannibal was the military genius of his day. He led a great army, including thirty-seven war elephants, across the Alps to Italy.

tribes that remained friendly to the Romans. Finally, reaching the Alps, he transported his troops and elephants through a steep and snow-covered pass. In Italy he defeated the elder Scipio on the banks of the Ticino and forced his way steadily eastward and southward. For fifteen years the valiant young Carthaginian carried on a struggle against heavy odds. The Romans were often defeated, but they could always rebuild their armies. Hannibal was far from home and his forces steadily dwindled.

The younger Scipio, in the meantime, had invaded Carthaginian territory in Africa. Hannibal was recalled to his homeland, where he fought Scipio at Zama in 202 B. C., and suffered a crushing defeat. This battle forced the Carthaginians to give up the struggle.

The Romans demanded Hannibal's surrender and he escaped to Syria, where King Antiochus was preparing a war against Rome. Hannibal offered his aid, but the Syrians failed to follow his advice. Hannibal himself lost an important battle against the Rhodians. Escaping to Bithynia, he at last was trapped and, rather than suffer the humiliation of surrendering to the Romans, took poison. See CARTHAGE; PUNIC WARS; ROME, HISTORY OF.

HAN'OVER. This small province of Prussia has played an important rôle in European history. Originally a part of the Duchy of Brunswick, it was raised to an electorate in 1692, and in 1814, at the Congress of Vienna, was accorded the rank of a kingdom. In 1866 Hanover joined Austria in the war against Prussia. Following the crushing defeat of Austria, the small German kingdom was made a part of

HANSEATIC SUPREMACY FALLS BEFORE MILITARY CONQUEST
The island port of Wisby was a great city in the league, before 1360. In that year Valdemar Atterdag, the Dane, sacked the city, seized all its wealth.

Prussia by the Peace of Prague.

The throne of England today is occupied by a descendant of the electors of Hanover. On the death of Queen Anne, in 1714, Elector George Louis became George I of Great Britain, his mother, the Electress Sophia, being a granddaughter of James I. All the subsequent English kings until the accession of Victoria, in 1837, were also rulers of Hanover. When William IV died, the succession passed to the nearest male heir, a son of George III.

The present province has an area of 14,976 square miles. The population is about 3,375,000. Hanover is a rich agricultural and timber country, and the Hartz Mountains, in the southeast, have valuable deposits of iron and coal. The chief manufactures normally include cotton and woolen goods, leather products, and machinery. Shipbuilding is also important in normal times. The city of Hanover is the capital. Another city, Göttingen, contains the University of Göttingen, founded in 1734 by George II and subsequently the alma mater of many famous men.

HANSEATIC, *han se at'ik,* **LEAGUE, or HAN'SA,** THE. European commerce in the Middle Ages owes much to this organization of cities along the Baltic and North seas. Originally founded in the thirteenth century to combat raids of pirates, the Hanseatic League grew to be very powerful by the fifteenth century, maintaining armies and navies and contributing to commercial progress by constructing canals and developing a uniform system of weights and measures. Many of today's maritime laws date back to the code of the Hansa.

At first the Hanseatic League was only a compact between Lübeck and Hamburg to keep open the road, crossing Holstein, which connected the Baltic and North seas. In 1247 Brunswick joined the union and others followed, until at one time there were about eighty-five member towns. Assemblies of delegates from all the towns were held in Lübeck, where common problems were discussed. The Hansa in its most flourishing days defeated the kings of Denmark and Norway and deposed the king of Sweden. However, as princes and states came to recognize the value of extensive commerce, they built their own armed forces and conducted their own sea trade. Internal discontent, lack of co-operation from the other princes and German states, the growth of Dutch and English interests, and the rapid growth of trade, all contributed toward weakening the Hanseatic League. By the time America was discovered, the power of the Hansa was rapidly fading, although the name was retained until the nineteenth century by Lübeck, Hamburg, and Bremen.

HAPSBURG, *hahps'boork,* **or HABSBURG,** House of. One of the strongest and oldest imperial families in Europe, this house ruled from the thirteenth century until 1918 over the area occupied by the present countries of Austria, Hungary, and Czechoslovakia. From 1273 to 1806, all the emperors of the Holy Roman Empire, with the exception of two, were Hapsburgs. The name is derived from the word *Habichtsburg,* which means *hawk's castle,* the name of a castle believed to have been built by Bishop Wernér of Strasbourg in the eleventh century. His nephew, Werner, was the first to assume the name of Count of Hapsburg, and Rudolf I was the first of the emperors.

With the death of Charles VI in 1740, the male line of the Hapsburgs ended, but Charles's daughter, Maria Theresa, married Francis I of the House of Lorraine and continued the line. The most famous of the recent Hapsburgs was Francis Joseph I, who died in 1916 after a reign over the Dual Monarchy (Austria-Hungary) of sixty-eight years. He was succeeded by Charles I, who was forced to abdicate in 1918, bringing to a close the power of the House of Hapsburg. See Austria-Hungary.

HAR'BOR. Sheltered deep waters, where boats and ships can anchor, safe from violent seas, may be natural harbors or engineering works constructed by man. A good harbor is a necessary terminal for either coastwise or foreign commerce. Cities like New York, Boston, San Francisco, Liverpool, Havre, Hamburg, and so on, have grown to importance as commercial centers largely because of their natural harbors. Some of these cities are on great bays nearly enclosed by land; others are some distance from the sea on navigable rivers. Engineering skill provides great breakwaters to arrest the heavy seas where harbors must be made artificially.

Funds for improvement of harbors, which includes dredging and building of breakwaters, are usually provided by the national government; the building of docks, unless for government use, results from appropriations of the state or city in which they are located. Every harbor is in charge of a harbor master, who has complete authority over all vessels and commercial facilities within his jurisdiction. He may regulate the time of landing, loading, and unloading of all vessels; he exacts obedience to his commands, collects harbor fees, and may arbitrate disputes between masters of vessels.

HARD'ING, Warren Gamaliel (1865-1923). The story of the twenty-ninth President of the United States is concerned more with fate and circumstances than with ability and leadership. Born on a farm near Blooming Grove, Ohio, in ordinary surroundings, he rose on the wings of chance to the highest office in the land, with apparently little effort on his own part. In politics he was a Republican. The era of war-time Democratic dominance was at an end; and the party, rather than the man, won the election of 1920. Into office went Harding, a person whose friendliness and sincerity of convictions, whether well founded or not, made him, in general, liked by the American people.

Early Life. Warren G. Harding was born November 2, 1865. He worked about the farm during his childhood, attended school, and at the age of fourteen entered Ohio Central College at Iberia, from which he graduated at the age of seventeen. For a time he played in the community band and received elementary training in journalism as a typesetter on the local paper.

Newspaper work offered some fascination; so with the financial assistance of his father, in 1884 Harding acquired the Marion *Star,* a paper which then offered little promise. He struggled to give it new life and to make it a paying investment. After his marriage in 1891 to Florence Kling, daughter of one of Marion's leading citizens, he and his wife united their efforts and made the *Star* one of the most influential papers in the state. Harding sold it while President.

WARREN GAMALIEL HARDING
Twenty-ninth President of the United States
Administration: 1921-1923
Harding's period in office was one of national reconstruction after World War I. The Washington Arms Conference was called, and the 5-5-3 naval treaty drafted. The administration was marred by the misconduct of several high officials of government.

Entrance into Public Life. In 1900 and again in 1902, Harding was elected to the state senate. At the end of his second term he was made lieutenant governor. He was drawn into party councils and Republican politics and finally realized ambitions to serve as a delegate to several national Republican conventions. Following the adoption of the Constitutional amendment providing for direct election of Senators by the people, he was elected to the United States Senate by a large majority in 1914 and was appointed to the Committee on Foreign Relations.

During his term and throughout World War I, Harding did little to influence public policy, but in 1920 he was one of the leading candidates for the Republican nomination for President. His past record, although not outstanding, was free of political stain, making him the type of candidate the party could afford to back.

In the campaign Harding was forced to support party policies instead of expressing his own views. Arguments centered primarily on the issues of ratification of the Versailles Treaty and participation of the United States in the League of Nations and the World Court. The Democratic platform strongly endorsed these measures. Harding defeated the Democratic candidate, James M. Cox, also from Ohio, by an overwhelming majority.

In the White House. The Cabinet selected by the new President was strangely diversified, with some excellent choices and some very poor ones. Among the outstanding figures were Charles Evans Hughes, Secretary of State; Herbert Hoover, Secretary of Commerce; Andrew W. Mellon, Secretary of the Treasury; and John W. Weeks, Secretary of War. Albert B. Fall, Secretary of the Interior, and Harry Daugherty, Attorney-General, were among the poorer choices and later were the major figures in the Teapot Dome oil scandal, which rocked the entire nation.

Under authorization of the Senate, President Harding in 1921 called a conference of eight other powers, namely, Great Britain, France, Italy, Japan, China, the Netherlands, Portugal, and Belgium, to consider the limitation of naval armaments. The delegates met at Washington to discuss the reduction of navies and to consider problems of the Far East.

The Versailles Treaty was not ratified; so separate treaties of peace were negotiated with Germany and Austria, which were ratified by the Senate. Colombia was given a cash settlement in the dispute arising over claims relative to the Canal Zone. These events comprised the major foreign-policy problems of the administration.

Turning attention to national welfare, Congress approved a provision for a Federal Bureau of the Budget, which placed the government of the United States on a more business-like basis. President Harding appointed Charles G. Dawes, later Vice-President under Coolidge, to the post of Director of the Budget.

In 1921 Secretary Fall persuaded the President to sign an order transferring the oil-reserve land of the navy from the Navy Department to the Interior Department. This land included an area at Teapot Dome, Wyoming, which Secretary Fall leased to the Sinclair Oil Company. In court proceedings later, evidence brought out the fact that he received for this service the sum of $100,000. Another section was leased to Edward L. Doheny. Six years were spent in bringing about the conviction of Fall, although the scandal broke in 1923. That same year, the head of the Veterans' Bureau, a personal friend of the President, was convicted of defrauding the government and was sentenced to prison. Attorney-General Daugherty was involved in a number of intrigues, including the destruction of valuable, yet incriminating, records.

The Alaska Tour and Death. Whether Harding was advised by his counselors to take a trip through the West and to Alaska for purposes of working out new policies or to escape the coming exposure in Washington has long remained a question. Nevertheless, while on a tour in Alaska, he suddenly became ill. His engagements in Seattle were kept, but when he reached San Francisco, he was confined to his bed. There the President managed to make one last appeal for the World Court. It proved to be his farewell address, for on August 2, 1923, he died of a stroke of apoplexy. His body lies in a memorial tomb in Marion, Ohio.

HARD'Y, THOMAS (1840-1928). Last of the Victorians, first of the moderns, Thomas Hardy holds high rank among outstanding literary figures of England. Born in Dorset County, England, in a small village near Dorchester, Hardy began his career as an architect. However, he soon began writing, and in 1872 his first important novel, *Under the Greenwood Tree,* appeared.

Other well-known novels include *Far from the Madding Crowd, The Return of the Native, The Woodlanders, Tess of the D'Urbervilles,* and *Jude the Obscure.* Hardy also wrote poetry and short stories, one volume of which is *Life's Little Ironies.* His best poetic works are *The Dynasts* and *Winter Words.*

Hardy's books have an atmosphere of gloom and are often powerfully moving, yet they are rich in delightful characterizations and brilliant descriptions, and they give a realistic picture of England in the last half of the nineteenth century.

HARE. The rodent that is correctly called a hare is characterized by long hind legs, long ears, short, upturned tail, and a tiny pair of front teeth, wedged in at the base of the long front teeth, used in gnawing. In the United States, many hares are incorrectly known as *rabbits.* The true rabbits are smaller, and young rabbits are born blind and hairless, whereas young hares have open eyes and a coat of fur (see RABBIT).

Hares are among the most abundant and widely distributed families of animals in North America, the different representatives occurring from the extreme Arctic lands to the tropics. The different kinds are known under a great variety of local names. The so-called "jack rabbit" is really a hare; the Belgian "hare" is a rabbit.

Hares depend to a large extent for safety upon their remarkable powers of concealment, due to their motionless crouching and the extent to which their color blends with their surroundings. Most interesting color adaptations are found, from the permanently white forms occurring in regions of perpetual snow to those which become white in winter and brownish gray in summer through a change, or molt, of the hair.

The rapidity with which hares increase in numbers wherever there is an abundant food supply is well known. They are able to maintain themselves in a most remarkable degree in spite of the enormous numbers killed each year by natural enemies, such as predatory birds and animals, and by man for food and sport, and to protect orchards and crops from damage.

HAREBELL. Familiar to everyone is the harebell, more commonly known as "the bluebell of Scotland." Found in dry, rocky soil in both Europe and America, it has blue, bell-shaped flowers hung on thin stems from four to six inches in height. In some cases the flowers are white. There are few leaves.

HARMONICS, *har mon'iks.* When the G string of a violin is plucked, we not only hear the musical sound G, but also many other minor tones which are called *harmonics.* It is impossible to produce a single tone alone, although one tone seems to stand out above the others. This tone is called the *fundamental.* The secondary tones, or harmonics, are produced because the lengths of some of the vibrations along the string are shorter or longer than others.

There is a complete series of harmonics corresponding to each note of the scale. The first harmonic of any fundamental tone is the *octave* and is made by the vibration of half the string. For example, when the G string is plucked, not only does the whole string vibrate, but also half the string is vibrating more or less independently, producing a tone an octave higher than the fundamental tone. Thus the first harmonic of the fundamental is the octave.

In the same way, each third of the string produces the second harmonic, which is the fifth, or *dominant,* of the fundamental tone. Any body which "rings," such as a pipe or a string, follows the principles of harmonics. The study of this subject is important in music, since some musical instruments allow certain harmonics to be more clearly expressed, while muffling others. Thus many variations in tone may be secured. See MUSIC; SOUND.

HARMONY. Nearly all the music we hear depends for its effect upon harmony, which is the combining of more than one sound simultaneously. Thus in a quartet, one voice sings a melody, while at the same time the others sing harmony, which usually consists of a series of notes subordinate to the principal theme, but supporting it and adding tonal color to the ensemble.

Technically speaking, harmony is the science, or art, of so arranging the tone-color background for a melodic line that it is pleasing to the ear, and so that it creates a certain desired effect upon the listener. It is by this means that a great composer is able to make a simple, brief, melodic phrase sound majestic or sad or gay, according to his wishes. It was only in the eighteenth century that the principles of harmony became fully understood.

HAROLD I (? -1040). When Canute, king of England, Denmark, and Norway, died in 1035, he was succeeded by his sons, Harold and Hardecanute, who preferred to split up the land rather than to quarrel over the throne. Civil war was thus avoided. Later, however, because Hardecanute remained in Denmark, the people became dissatisfied and crowned Harold (surnamed *Harefoot*) sole king of England in 1037. He ruled but three years, dying in 1040.

HAROLD II (about 1022-1066). Last of the Anglo-Saxon kings of England, Harold became Earl of Wessex upon the death of his father, Earl Godwine. At the same time, he assumed the leadership of the nationalist party, an organization which was trying to undermine the Norman influence in the court of Edward the Confessor. Upon Edward's death in 1066, the nobles selected Harold as their ruler.

But William of Normandy in Northern France also claimed the throne, and in order to enforce his claim, invaded England with an army. He met Harold's

(1) Courtesy Lyon and Healy

ANCIENT MUSIC

The harp, or some instrument related to it, was probably the first music maker. (1) Modern Aeolian harp. (2) Medieval English harps. (3) Early Egyptian harp. (4 and 5) A Greek harp and lyre.

forces at Senlac, near Hastings, in October, 1066, and Harold was killed. William was immediately crowned king. See HASTINGS, BATTLE OF; WILLIAM I.

HARP. For at least 3,000 years, the mellow tones of the harp have charmed lovers of this beautiful instrument. It was known in ancient Egypt and in Assyria, and, as its name in nearly every European language bears witness, it was also familiar to the primitive tribes of North Europe. In Ireland, Scotland, and Wales the harp has been a favorite instrument for longer than we know, and

> The harp that once through Tara's halls
> The soul of music shed

is but one of many famous Celtic harps.

The harp in use today is the *double-action* harp invented by a Frenchman, Sebastian Erard, at the beginning of the nineteenth century. Its forty-six strings are tuned to give the key of C flat major. Around its base are seven pedals which may be depressed and secured at two different notches. Depressing the F-flat pedal to the first notch shortens all the strings of like name and raises their pitch one half tone, to F; depressing the same pedal to the second notch raises the pitch another half tone to F sharp.

If all the pedals are depressed to the second notch, the harp is in C sharp major, a whole tone higher than its original key. The harp is the only stringed instrument on which F sharp can be distinguished from G flat; G sharp from A flat, and so on (see MUSIC) without dependence on the musical ear of the player.

The harp is both a beautiful solo instrument and a valuable addition to the orchestra. It is said by musicians to be easier to play than the piano.

HARP'ER'S FERRY, W. VA. Eighteen months before the Civil War began, October 16, 1859, John Brown, a fanatical abolitionist, conducted a raid on a Federal arsenal at Harper's Ferry, a little settlement on the Shenandoah River fifty miles northwest of Washington, D. C. It was Brown's plan to arm the slaves, who were to revolt. The raid, though unsuccessful, greatly angered the South.

During the Civil War, the Confederates, first under "Stonewall" Jackson and later under General Joseph E. Johnston, occupied Harper's Ferry until June 15, 1862, when it was taken by the North. Lee again took it over in September of that year. Today, with a population of about 700, it is only of historical importance. See BROWN, JOHN.

HARPIES. Rulers of the storms, according to ancient Greek legends, were the harpies. These creatures were described differently by the various Greek poets, some portraying the harpies as beautiful maidens, some saying that they were hideous. The latter opinion prevailed, principally because this was the conception of the later poets who influenced the Roman writers.

HAR'RIS, JOEL CHANDLER (1848-1908). "Br'er Rabbit" is a beloved character in American folk literature, as much a part of Southern tradition as cotton fields and Negro spirituals. He was the creation of Joel Chandler Harris, author of the "Uncle Remus" stories.

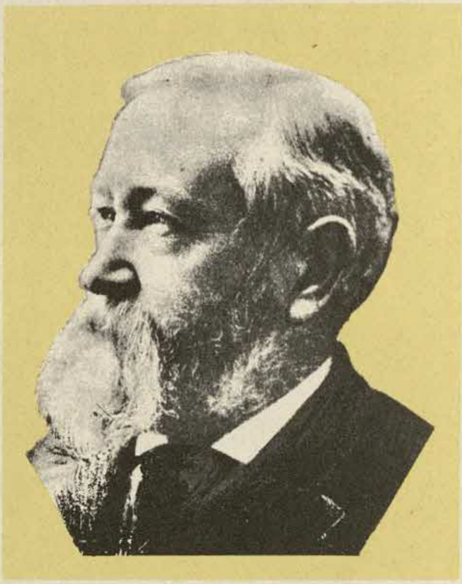
A native of Eatonton, Ga., Harris started out as a printer's boy. Following a course in law, he joined the staff of the Atlanta *Constitution* in 1876 and remained there for twenty-five years. While he was writing for the paper, his first Uncle Remus stories appeared and were published in 1880 in book form as *Uncle Remus: His Songs and Sayings.* They were immediately popular, and other volumes entitled *Nights with Uncle Remus* and *Uncle Remus and His Friends* appeared. He also wrote *Daddy Jake, the Runaway; Sister Jane; The Tar Baby and Other Rhymes; Free Joe; Aaron in the Wildwoods; Tales of the Home Folks; Balaam and His Master,* and *A History of Georgia..*

Harris depicted the picturesque customs and dialogue of the Southern Negro, and his books are numbered among the significant works in American literature.

HARRISBURG, PA. One of Pennsylvania's most beautiful cities is Harrisburg, its capital, which lies along the banks of the picturesque Susquehanna River at a point where the river is a mile wide. Situated in the southeastern part of the state and surrounded by rich coal and iron deposits, it is also an industrial center. Products include iron and steel, knit goods, machinery, food products, boots and shoes, tobacco, lumber, and silk goods. Many people are also employed in the shops of the Pennsylvania Railroad.

The people of Harrisburg have paid particular attention to its appearance, and there are now several beautiful parks that almost surround the city. A park and bathing beach have also been built along the river front. Crossing the river at Harrisburg are several bridges, the most imposing of which is the Soldiers' and Sailors' Memorial Bridge, half a mile in length. The most beautiful building is the modern state capitol. Other important buildings include an arsenal, hospital, county prison, and the governor's home.

John Harris was the first to settle at the present site of the city about 1726. Some years later his son operated a ferry across the Susquehanna at this point and the small settlement became known as Harris' Ferry; but the name was changed to Harrisburg in 1785. The town was made the state capital in 1812. Harrisburg has a population of about 80,000.



BENJAMIN HARRISON
Twenty-third President of the United States
Administration: 1889-1893
The outstanding event of Harrison's administration was the first Pan-American Conference. The President himself was a conservative Republican and an astute politician.

HAR'RISON, Benjamin (1833-1901). One of the few Presidents of the United States to represent the minority of the people, Benjamin Harrison was in no sense a popular leader; but he did possess a rare sense of honesty and the courage to express his convictions. By the grace of the electoral-college system he defeated his opponent, Grover Cleveland, who had a plurality of 100,000 popular votes but fell short of acquiring enough electoral votes (see Electoral College). The administration of Harrison was primarily concerned with the development of the western frontier and the settling of political differences in the Western Hemisphere.

Early Life. The twenty-third President of the United States was born at North Bend, Ohio, August 20, 1833. He was the grandson of the ninth President, William Henry Harrison, and great-grandson of Benjamin Harrison, a signer of the Declaration of Independence. He worked on a farm in his youth and attended a log-cabin school. He studied with a tutor in preparation for college and attended an academy called Farmers College, near Cincinnati, for two years. In 1852 he graduated from Miami University. He then studied law and in 1854 moved to Indianapolis, where he built up a fine law practice.

Soldier and Statesman. During the Civil War, Harrison served with the Union forces, first as lieutenant and then as colonel when he organized a volunteer regiment from Indiana. As a soldier he performed his duties bravely and won distinction in the Atlanta campaign. By the end of the war he was a brigadier general.

For a time, after the war, he served as a reporter in the Indiana supreme court and then returned to the practice of law. He was nominated by the Republicans for governor of Indiana but was defeated. However, in 1880 he was elected to the United States Senate. Although a Senator for only one term, Harrison rose to prominence for actively supporting civil-service reforms and restrictions on Chinese immigration. He carried on the fight for Chinese restriction until the passage of the Chinese Exclusion Act in 1892, after he became President.

The Campaign and Presidency. The

tariff question was the most important in the Presidential election of 1888. Supporting the existing high protective tariff, Harrison conducted what has since been called the "front porch" campaign. At his own home he addressed delegations and expressed his views. Although apparently the public voted against continuing the high tariff, the policy was upheld by virtue of the electoral-college vote which defeated Cleveland, Harrison's opponent.

Busy days were ahead for the first Congress under the new President. The Republicans pushed through three of their favored bills. The Sherman Silver Purchase Act and the McKinley Tariff Act fulfilled campaign promises; and the Sherman Anti-Trust Act was the most revolutionary legislation of its time, for under this law private monopoly was severely restrained by Federal authority. In 1889-1890, North and South Dakota, Idaho, Wyoming, Montana, and Washington were admitted to the Union. Also in 1889 the Indian Territory (now Oklahoma) was opened for settlement. On the day the territory was opened, 50,000 settlers swarmed into the new land.

One of the most capable Secretaries of State in American history, James G. Blaine, carried out Harrison's foreign policy. Of utmost importance was the first Pan-American Congress for nations of North, South, and Central America. At this time the United States negotiated reciprocity treaties with Brazil and Spain. Two possible wars were averted by Blaine. One dispute with Great Britain over the rights of fishermen in the Bering Sea was settled by arbitration. A dispute with Italy over the death of eleven Italians at the hands of a New Orleans mob was settled with payments to the families of the victims.

In 1892 the tariff question again arose, and this time Grover Cleveland succeeded in obtaining a true voice of public sentiment. The Democrats secured not only the executive post but control of Congress.

Later Years. Harrison was a hard-working executive, and passing from political life did in no sense imply to him passing from public life. He lectured at Leland Stanford Junior University and wrote for periodicals. In a legal capacity he represented Venezuela before the commission of arbitration in a case involving a boundary dispute with Great Britain. He was appointed to represent the United States at the Hague Peace Conference in 1899. He also wrote two books, *This Country of Ours* and *Views of an Ex-President,* the latter published after his death. He died at Indianapolis on March 13, 1901.

HARRISON, WILLIAM HENRY (1773-1841). With the rallying campaign cry of "Tippecanoe and Tyler too," William Henry Harrison became the ninth President of the United States in 1840 by an overwhelming electoral vote. His administration, however, was the shortest in American history, for he died just one month after his inauguration. He was the son of Benjamin Harrison, a signer of the Declaration of Independence, and the grandfather of Benjamin Harrison, the twenty-third president.

Early Life. William Henry Harrison was born on February 9, 1773, at Berkley, Va. At the age of seventeen, his education was completed at Hampden-Sidney College. The next year he joined the army of Wayne, which was battling the Indians of the Northwest, and made a fine showing. From ensign he rose to lieutenant and aide-de-camp to Wayne and then captain.

Political and Military Career. Resigning his commission in 1798, he became secretary of the Northwest Territory and later congressional delegate from the territory. He supported a bill which provided for the selling of Federal land in small units. From 1801 to 1812 he served as governor of the Indiana Territory, which included the present states of Wisconsin, Illinois, Michigan, and Indiana. Despite his attempts to be friendly to the Indians, he had to engage in several armed conflicts to prevent general uprisings. He defeated the Indian chief, Tecumseh, and the Prophet, Tecumseh's brother, in the famous Battle of Tippecanoe. It was because of his bravery in this battle that Harrison won the nickname "Tippecanoe," which played an important part in his Presidential campaign years later.

As major general of the Kentucky militia and later as brigadier general of the regular army, he made an outstanding record in the War of 1812. Chief of the Northwest forces, he withstood the attack of the British under Proctor and later pursued them into Canada, where he won a victory in the Battle of the Thames. Immediately, Harrison became a military hero.

The state of Ohio elected him to Congress in 1816, to the state senate in 1819, and to the United States Senate in 1824. He did not, however, complete his term of office in that body. For one year (1828) he served as United States minister to Colombia. Upon his return to the United States, he resided at his Ohio home for the next few years.

The Campaign and Presidency. Harrison's first campaign for the Presidency in 1836 as a candidate of the Whig party was unsuccessful. In the next campaign (1840), nominated with John Tyler for Vice-President, Harrison defeated Van Buren. The campaign was the first in the United States to employ the mass meeting, parades, slogans, and lively political rallies which were to form an important part of succeeding campaigns. Harrison's opponents ridiculed a log-cabin section of his home and the cider frequently served at his table; but the Whigs cleverly adapted these jeers to their own advantage. Harrison was proclaimed a man of the people, and small log cabins bearing the names of the candidates were used as symbols. The Whigs won an overwhelming victory, and Harrison and Tyler were elected.

WILLIAM HENRY HARRISON
Ninth President of the United States
Administration: March 4 to April 4, 1841
After a long and distinguished military career, Harrison entered office in poor health and died only a month after his inauguration. He had the support of the Whig leaders.

The strenuous campaign, however, exhausted Harrison, and he was unable to withstand an attack of pneumonia. He died on April 4, 1841, a month after his inauguration, and was succeeded by John Tyler.

HARTE, FRANCIS BRET(T) (1839-1902). For colorful and true-to-life stories and poems of the early days in California, no other writer surpasses Bret Harte. His real name was Francis Brett Harte, but for a pen name he dropped his first name and one *t* from his middle name. Under this name he wrote his widely read stories and poems.

The noted humorist was born at Albany, N. Y., but moved to California at the age of fifteen. At first the gold fields of Calaveras County attracted him, but later he obtained a position with the Wells-Fargo Express Company as messenger. It was then that he encountered the scenes and characters which provided the background for his stories.

Later Harte worked as a typesetter, drug clerk, and teacher. In 1857 he was a typesetter for the *Golden Era,* a San Francisco weekly, and began to write short sketches. Later he was an editor of the *Californian,* a weekly for which he wrote his *Condensed*

CLIMAX OF INDIAN WARFARE IN THE NORTHWEST TERRITORY
The Battle of Tippecanoe was fought at the direction of the Indian chieftain Tecumseh. The Americans were led by William Henry Harrison, who was the hero of the hour.

Novels, parodies on the styles of a number of authors. Becoming editor of the *Overland Monthly* in 1868, he published the best known of his short stories and poems: *The Luck of Roaring Camp, The Outcasts of Poker Flat,* and *The Heathen Chinee.* The last seventeen years of his life were spent in England, where he wrote more poems and stories of America's West.

HART'FORD, CONN. Steeped in the lore of colonial history and containing monuments and landmarks of the early settlers, Hartford is now a modern industrial city, the capital of Connecticut and the largest city in the state. It lies midway between New York and Boston.

Today Hartford is known as one of the great insurance centers of the United States, serving as headquarters for many leading insurance companies. The city has several hundred factories, which produce machinery of all kinds, tools, electrical goods, firearms, brushes, woolen goods, typewriters, and sewing machines.

Hartford contains many beautiful and historic buildings. Standing on a hill in one of the parks is the beautiful white marble capitol surrounded by other government buildings, including the supreme-court building and the armory. Other imposing structures are the Bushnell Memorial Auditorium, the Children's Museum, and the Morgan Memorial. Among the leading schools of the city are Trinity College, Saint Thomas' Seminary, and the Hartford Theological Seminary.

Of interest to visitors are the old homes of Harriet Beecher Stowe, Mark Twain, and Charles Dudley Warner. One of the landmarks is the site of the famous Charter Oak, where the royal charter of Connecticut was hidden for two years. Another place of interest is the office of the oldest newspaper in the United States, the Hartford *Courant.*

When the Dutch held part of New England, they built a fort on the site of Hartford in 1663. Three years later a group of Puritan colonists led by Thomas Hooker and Samuel Stone established a settlement here. In 1784 Hartford was chartered as a city. For a number of years it shared with New Haven the honor of being the capital of Connecticut, but Hartford was finally

THE CONQUEST OF THE SCEPTERED ISLE
In 1066 William the Conqueror, a Norman, defeated the English at Hastings, seized the throne.

chosen the sole capital in 1873. The population is about 162,000.

HARTFORD CONVENTION. A deathblow to the Federalist party was struck by the Hartford Convention, a political meeting held by opponents of James Madison and the Senate "War Hawks." In session from December 15, 1814, to January 5, 1815, at Hartford, Conn., the meeting was a secret conference of Federalists who condemned the War of 1812.

The convention at first was thought to be a meeting to plan the secession of the New England States because of their opposition to the war, but it really was a convention to draft reforms leading to more freedom for the states. Because this policy completely reversed the Federalist stand of former years, and because of the secession rumors, the convention brought about the end of the Federalist party.

HAR'VEY, William (1578-1657). The true theory of the circulation of the blood was first announced by William Harvey, an English physician. Today the idea of circulation of the blood is commonplace, but Harvey's theory was startling to the people of his day.

He received his education at Caius College, Cambridge, and at the school of medicine in Padua, Italy. Upon receiving the degree of M. D. in 1602, he returned to London, was admitted as a fellow of the Royal College of Physicians, was elected to the staff of Saint Bartholomew's Hospital, and in 1616 was made a lecturer at the College of Physicians, where he announced his findings on circulation. His first writings on the subject were published in 1628.

Harvey served as physician to kings James I and Charles I, was present at the Battle of Edgehill, and went with Charles to Oxford. Elected master of Merton College at Oxford, he lost the post when the city surrendered to Parliament. He returned to London in 1646 and spent his last days quietly. See Circulation.

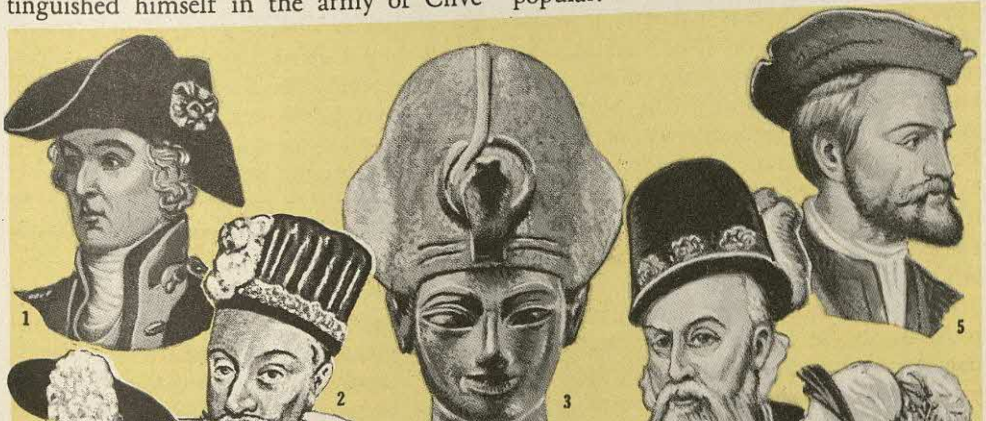
HASTINGS, Battle of. October 14, 1066, marked a turning point in English history, for on that day the Battle of Hastings was fought, between the Anglo-Saxons and the Normans. Through the victory of the Normans the throne was transferred from Harold II, son of Earl Godwine, to William the Conqueror, Duke of Normandy.

William had made preparations for taking the crown when Edward the Confessor was king of England. He asserted that the king had promised to declare him his successor if Edward died childless. Upon Edward's death in 1066, however, Harold was elected king of the nobles, and William, in order to assert his rights, invaded England. The two forces met at Senlac, near Hastings, and in a fierce battle, the Normans won. Harold was killed, and William was proclaimed king. This important battle is included among the so-called fifteen decisive battles in history. See WILLIAM I.

HASTINGS, WARREN (1732-1818). For eleven years Warren Hastings served as the first Governor-General of India at a time when that country was under the sway of the British East India Company. Educated at Westminster School, he went to Bengal in 1850 in the employ of the company as a writer. While there, he distinguished himself in the army of Clive and by 1761 had obtained a seat in the Bengal council. Three years later he went back to England for five years. When he returned to India, he was made a member of the council at Madras and succeeded not long after to the presidency of the supreme council of Bengal.

His administration as Governor-General, begun in 1774, was in most respects a good one and beneficial to Great Britain; but financial pressure from the East India Company caused him to engage in some rather questionable activities which later served as a basis for charges brought against him in Parliament. After Hastings had resigned his post and returned to England, in 1788, Burke, Fox, Sheridan, and Grey accused him, in a famous trial, of performing acts of injustice and aggression and of having accepted bribes. For seven years the trial dragged on, until at last Hastings was acquitted. The next year, impoverished by the trial, he was granted an annuity by the East India Company.

HAT. Through the ages, men and women have worn many types of headgear—caps, bonnets, helmets, cowls, shawls, and hats. Today the hat is the most popular.



HATS—AGE OLD SYMBOLS OF RANK
(1) Military cocked hat, 1780. (2) Royalty in 1600; Sigismund III of Sweden. (3) Egyptian, 1000 B.C. (4) Noble headgear, 1590. (5) Tricorn's ancestor, 1530. (6) Another 1530 hat. (7) Turban.

HATS AND HEADGEAR PROCLAIM THE WEARER'S NATION
(1) The bejeweled headdress of an Indian maharani. (2) Modern fez on an Egyptian khedive. (3) Feathered headgear of an American Indian. (4) The starched lace of a Dutch lady.

To satisfy the demands of style-conscious men and women, there has developed a large industry employing thousands of persons, who are engaged in the manufacture and sale of hats. Hats are usually made of felt, straw, or silk. Felt hats are made by soaking the hair of rabbits, hares, or muskrats in chemicals, and reducing the mixture to a pulp that can be pressed into sheets. From these sheets, the felt is molded into the desired size and shape. The derby hat also is made of felt, but is stiffened while being shaped.

Straw from the reeds of strong plants is used for straw hats. One method is to make braids by plaiting the straw. The hat is finished by sewing the braids together. Another method, used for making Panama hats, is to weave the straw into a cloth which is then pressed into shape. A silk top hat is constructed of a stiff cylindrical board and covered with a plush, usually of silk.

Both Greeks and Romans wore hats, but usually only for traveling. Felt hats were first manufactured in Germany in the fourteenth century, and in France shortly after. The eighteenth century saw the introduction of the cocked hat; and in the nineteenth century the felt hat, made of beaver fur, was popular.

Women seldom wore hats until the nineteenth century, usually covering their heads with shawls or bonnets. However, lavish styles were introduced for women, and soon feathers, flowers, and other decorations were used profusely.

HAUPTMANN, *howpt'mahn,* **GERHART** (1862-1946). An idealist, sometimes even approaching the mystic, this German winner of the Nobel Prize for Literature (1912) became recognized as one of the foremost contemporary dramatists. His individualistic philosophy was expressed in the statement, "Live your own life." With a broad understanding of human nature, he depicted everyday life, even stressing the unpleasant sides of life, as in *The Weavers* and *Before Sunrise*. The best of his idealistic plays is probably *The Sunken Bell*. Hauptmann published a volume of poems, *Springtime*, and a book of *Travel Sketches*, in addition to his many dramatic works.

HAVANA, *ha van'a,* **or HABANA,** *hah bah'nah,* CUBA. Few cities combine the charm of historic places and the beauty of modern development as does Havana, capital and largest city of Cuba. Stretching along the level shore of the Caribbean, Havana and its harbor present a striking picture to passengers of incoming liners, for back of the park fronting the sea are wide boulevards and attractive public buildings. Overlooking the harbor, where the battleship *Maine* was blown up in 1898, are two old fortresses, Morro Castle and Castillo de la Punta.

Although Havana has been modernized,

chiefly by American influence, many of its old sites and buildings are still preserved. In the older sections are many buildings of historic interest fronting streets so narrow that two people are unable to pass each other. In the modern sections are broad boulevards along which have been built public gardens and large office buildings. There are many government buildings, several hospitals, and palatial hotels. The President's palace and the granite and marble capitol are outstanding. One of the most important boulevards is the Prado, lined with trees and fashionable homes.

The greatest industry in the city is the manufacture of the famous Havana cigars. They make up a large part of the exports, along with tobacco leaf, sugar, molasses, and rum. Havana, situated only ninety miles from Key West, is in daily communication with the mainland by boat and airplane.

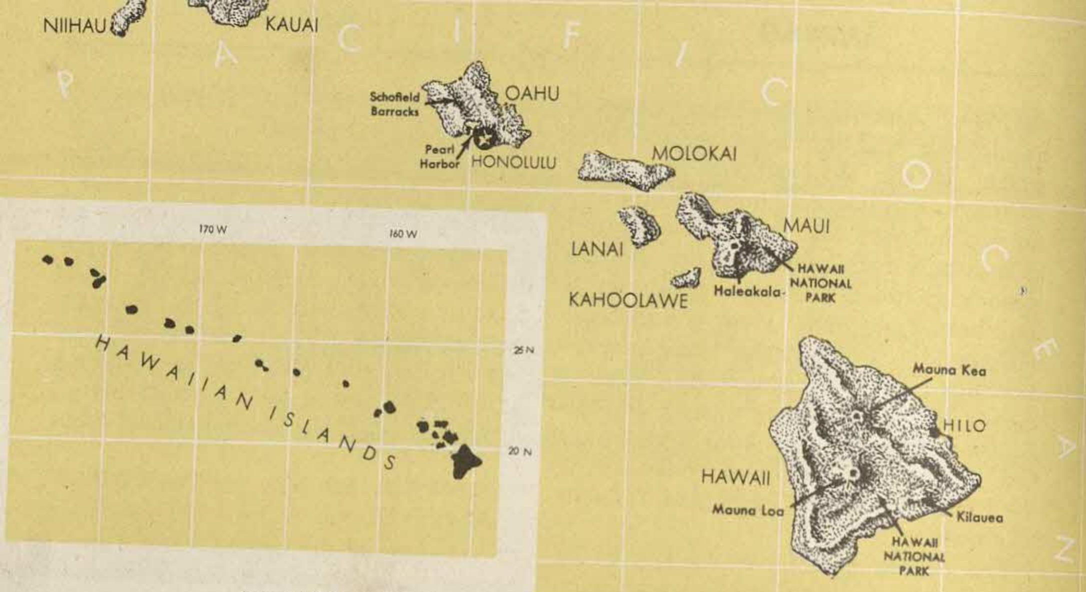
Havana was founded by the Spanish in 1514, but not on the present site, which was not selected until 1519. With the exception of one year (1762-63), when the British occupied the city, it was under Spanish control until Cuba became independent in 1898. Havana has changed from a poorly built, unsanitary city to a thriving, healthful, industrial center, which attracts many tourists. It has a population of about 1,158,000.

HAWAII, *hah wi' e,* or **HAWAIIAN** *hah wi' an,* **ISLANDS.** After fifty-nine years as a territory of the United States, Hawaii became its fiftieth state by Act of Congress adopted in March, 1959. The most tropical state in the Union, Hawaii was admitted less than a year after the admission of the

Hawaii Visitors Bureau

HAWAII, 50TH STATE, IS A LAND OF FLOWERS

This Hawaiian girl wears hibiscus in her hair, carries *leis* (wreaths) of orchids. Her loose-fitting traditional dress is called a *muumuu.*



HAWAII—TROPICAL PARADISE OF THE PACIFIC
Main islands are Oahu *(Gathering Place)*, Hawaii *(Big Island)*, Maui *(Valley Island)*, Kauai *(Garden Island)*, Molokai *(Friendly Island)*, Lanai *(Pineapple Island)*, Niihau *(Mystery Island)*, and Kahoolawe.

most northerly state, Alaska.

Hawaii is the only all-island state and the only one entirely separate from the mainland. With a total land area of 6,454 square miles, it is larger than Connecticut, Delaware, or Rhode Island.

Although it lies across 2,000 miles of ocean from North America, its representatives in Congress can reach Washington, D.C., within nine hours of flying time. This is less time than was required by representatives of many other states before the advent of fast, modern travel.

Importance. The name Hawaii calls to mind "the beach at Waikiki," plaintive island melodies, surf riding, and hula dances. Yet the new state is far more than an enchanting playground. It is the western outpost of defense of the United States, and a center of transportation and trade in the Pacific. Hawaii, too, is the source of much of the world's supply of sugar and 70 per cent of its pineapple fruit and juice.

Geography. A group of islands of volcanic origin, Hawaii lies half way between Asia and North America, about 1,000 miles north of the equator. There are eight major islands. The largest of these, Hawaii, contains Mauna Loa, a volcanic crater and the world's largest single mountain mass. The capital city, Honolulu, is situated on the third largest island, Oahu. Diamond Head, overlooking Honolulu harbor, is an extinct volcano. The islands have deeply indented coast lines, providing fine harbors. Although mountainous, they have fertile slopes and valleys.

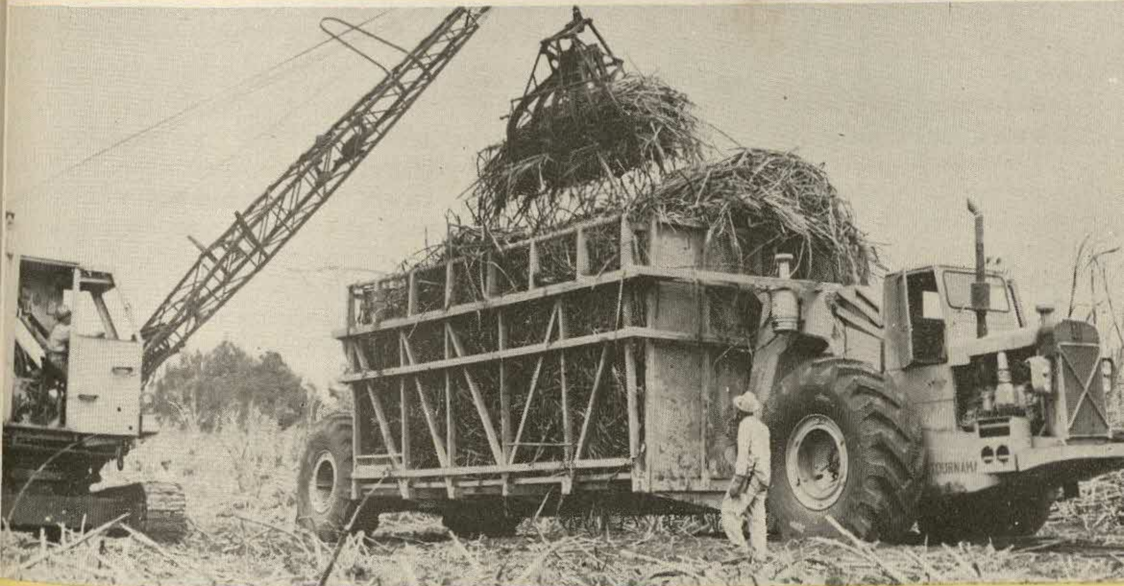
Military Bases. The commander of United States forces in the Pacific has headquarters near Honolulu. Major army bases are on Oahu Island. Naval headquarters are at Pearl Harbor and the Marine Corps station is on Mokapu Peninsula. All United States military activities in the Pacific basin are directed from Hawaii.

Commerce. Located at the crossroads of the Pacific, the islands are visited by vessels traveling between the ports of North America and eastern Asia. They are also a center for air transportation, commercial and military. There are many modern airports on the islands.

Products. Sugar is grown on twenty-seven plantations and more than a million tons are marketed annually. More than thirty million cases of pineapples and juice are shipped from the islands each year. Hawaii is one of the largest producers of orchids, which are flown to florists on the mainland. Coffee, rice, and tobacco also are

"HUKILAU"—TRADITIONAL HAWAIIAN FISHING PARTY *Hawaii Visitors Bureau*

Fish caught in huge nets are baked on the beach in mounds of sand and hot stones.



SUGAR CANE—HAWAII'S LARGEST CROP

Three-fourths of the state's cultivated land is planted in cane. Stalks are hauled to mills where the juice is extracted. The sugar is then shipped to California for refining.

grown. The second largest Hereford cattle ranch in the world, the Parker ranch, is located on Hawaii Island. It dates back to 1793.

Tourists. Hawaii has enjoyed a great increase in tourist business since the end of World War II, partly because it has become easier to reach by means of airplanes and fast ocean liners. Luxury hotels have been built. The climate is mild at all seasons. Hawaiians and visitors to the islands are able to swim comfortably in the ocean throughout the year.

People. Hawaii presents a unique example of a harmonious mingling of races—Caucasian, Oriental, and African. Its first settlers probably were Polynesians from Tahiti in the twelfth century. Then came immigration from Japan, China, America, Europe, and Africa.

When Hawaii became a state about 35 per cent of its people were Japanese or of Japanese ancestry. About 20 per cent of the residents were white. Other groups included Hawaiians of mixed ancestry, Filipinos, Chinese, Puerto Ricans, Koreans, and Negroes. The population was estimated at 600,000. Honolulu is a city of about 300,000, and the second city, Hilo, has a population of 30,000.

Education. A free public school system provides compulsory education for boys and girls from six to sixteen. English is the language in the public schools. The Chinese and Japanese languages are taught in private schools. About 6,000 students attend the University of Hawaii.

Hawaiian is the second language of a large part of the adult population. Hawaii has seven daily and seventeen other newspapers, and seven television and fifteen radio stations.

History. The Hawaiian Islands were known as the Sandwich Islands following their discovery in 1778 by the English explorer, Captain James Cook, who chose to name them after his patron, the Earl of Sandwich.

The islands were unified under King Kamehameha I in 1795, ending a series of tribal wars. Under his successor, Kamehameha II, missionaries from America arrived in 1820 and Christianity began to prevail throughout the islands.

Hawaii was recognized as an independent kingdom by the American, French, and British governments after 1843. After the reign of two elected kings, Hawaii had its first queen, Liliuokalani, who succeeded her brother in 1891. She was the composer of the famous Hawaiian melody, "Aloha Oe." She was deposed by revolution in 1893 and on July 4, 1894, Hawaii was proclaimed a republic. Its first president was Sanford B. Dole. When Hawaii became a territory in April, 1900, President McKinley appointed Dole as its first governor.

A tragic highlight in the history of Hawaii was the attack by Japanese bombing planes on December 7, 1941, on the United States naval base at Pearl Harbor. This act brought the United States into World War II. Many Japanese residents of Hawaii volunteered for enlistment in the United States Army and they were accepted for service in limited numbers. They won so many decorations and citations for valor that they became known as the Purple Heart Battalion.

Hawaii first petitioned Congress for statehood in 1903. Fifty-six years later, after its twenty-fourth request, the beautiful territory which Mark Twain called "the loveliest fleet of islands anchored in any ocean" achieved its goal.

Instead of being appointed by the President, Hawaii's governor now is elected by the voters. As a state it sends two Senators and one Representative to Washington. It continues to govern its own affairs in a two-house state legislature of fifteen state senators and thirty representatives.

HAWK. Related to eagles, kites, falcons, and ospreys, hawks are big, fierce birds of prey. They have no song, but utter loud, piercing cries. Their hooked beaks and strong feet enable them to capture small mammals, birds, and insects, and to tear them to pieces. Usually the female hawks are larger than the males. They are devoted mates and parents, and a pair will often remain together for life and return to the same place to nest, year after year.

There are several kinds of hawks. Usually the *marsh* hawk, or *harrier,* is put in a class by itself. It frequents fields and marshes, flying low and showing a white patch on the rump above the tail. The wings and tail are both long. It rarely attacks poultry, and, on the whole, is a beneficial species.

The next group includes the broad-winged, or fan-tailed, hawks correctly known as *buzzards.* They are beneficial birds of prey, doing immense good in the control of rodents and insects. These are the hawks that sail in great circles high in air and are often wrongly called *hen hawks,* or *chicken hawks.* The truth is that they seldom visit the poultry yard, and the

FARMERS' MIXED BLESSING
Though hawks usually feed on small animals which prey on farms, they also can kill poultry.

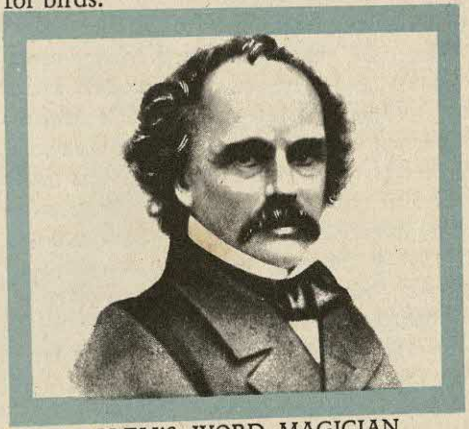
farmer or poultryman who kills a hawk of this type, believing it has caused his losses, makes a bad mistake and loses a good friend.

The species of broad-winged hawks common in North America are the *red-tailed* hawk and the *American rough-legged* hawk, found in both eastern and western sections of the country; the *red-shouldered* hawk and the *broad-winged* hawk, in the eastern half; and the *Swainson* hawk and the *ferruginous rough-legged* hawk in the West.

Finally, there are the true poultry thieves, *accipiters,* or short-winged hawks. These have short, rounded wings and long, narrow tails, and are different in habit from the beneficial hawks. They do not often soar in the air, but keep well hidden in woods and trees, rarely flying high. Included in this group are the species known as the *sharp-shinned,* the *Cooper,* and the *goshawk.*

HAWKS'BILL. The source of commercial tortoise shell is the hawksbill, a large, inedible turtle inhabiting the tropical seas. The hawksbill, frequently called the *caret,* has a broad, oddly shaped tail with which it fights off enemies. See TORTOISE.

HAW'THORN. The hawthorn, with its thorny stems and pink or white flowers, has been widely used as a hedge plant in America. This small tree, or shrub, which grows wild in many parts of Europe, Asia, and Africa, is a member of the rose family. The American thorn apple belongs to the same genus. In winter, haws, the bright-crimson berries of the shrub, provide food for birds.



SALEM'S WORD MAGICIAN
Hawthorne, author of *The House of the Seven Gables,* was one of America's great novelists.

HAW'THORNE, NATHANIEL (1804-1864). Literature flourished in the United States in the nineteenth century, and many poets and essayists rose to eminence. But in the field of fiction, few, if any, writers equaled Nathaniel Hawthorne, the author of *The House of Seven Gables, The Scarlet Letter, Mosses from an Old Manse,* and *The Great Stone Face.*

Hawthorne was born on July 4, 1804, in Salem, Mass. His education was mostly secured at home, but he loved to read, and to wander in the woods. His mother took him to Lake Sebago in Maine when he was fourteen, and he spent a great deal of his time taking long walks, skating, and exploring the White Mountains. It was during this period that he received the inspiration to write his well-known short story, *The Great Stone Face,* based on a curious rock formation on Profile Mountain.

When he was seventeen, Hawthorne became a student at Bowdoin College, where he was a companion of Henry Longfellow and Franklin Pierce, who later became

President. When he was graduated, he returned to Salem and devoted himself to writing, a vocation that gave him only a scanty living. In 1839 he became a weigher in the Boston Customhouse and, following that interval of two years, spent a year at Brook Farm, the experimental communistic settlement organized by the Transcendentalist group.

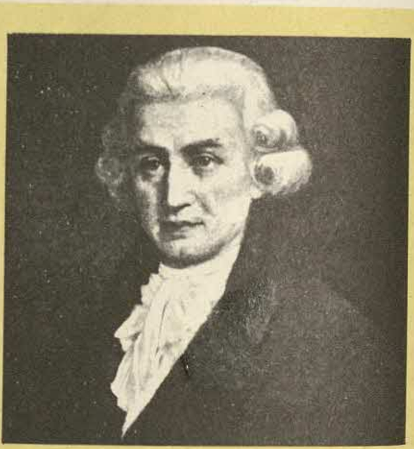
The next year he married Miss Sophia Peabody, and they settled in Concord. Here was written *Mosses from an Old Manse,* published in 1846. It was hardly a financial success, however, and Hawthorne was compelled to take another position as customhouse surveyor in Salem. He lost his job in 1849 because of a change in political parties; but immediately afterward he published *The Scarlet Letter,* which won him renown everywhere. Two years later *The House of Seven Gables* appeared, and his position as a writer was assured. There followed *The Blithedale Romance,* which related his experiences at Brook Farm.

In 1853 Hawthorne went to Liverpool as consul, appointed by President Pierce, the friend of his college days. Later he traveled in Italy and wrote his *English Notebook, Italian Notebook,* and *The Marble Faun.* Returning to America, he published *Our Old Home* and was forced to leave *The Dolliver Romance* uncompleted because of ill-health. To regain his health, he traveled and made a tour with Pierce. He died suddenly at the age of sixty in Plymouth, N. H., and was buried in Sleepy Hollow Cemetery, Concord, Mass.

HAY. Aside from corn and the various small grains, hay forms the world's most important crop for the feeding of livestock. It includes all the grasses and legumes that are cultivated for forage purposes—timothy, alfalfa, and the various clovers. Although man makes no direct use of it as food, hay is converted into meat and milk for his use by herds of dairy and beef cattle.

Haymaking consists of cutting, or mowing; raking into piles for drying; curing, or ripening, in the fields; and hauling and storing in barn lofts for later use. If hay is to be shipped or stored in a small space, it is also baled, because loose hay is extremely bulky.

The leading hay-producing states are New York, Wisconsin, Minnesota, Nebraska, California, and Iowa. The annual hay crop in the United States usually amounts to about 85,000,000 tons valued at many millions of dollars. Canada, too, has tremendous crops of hay; in average years the yield is about 16,500,000 tons. See GRASSES.

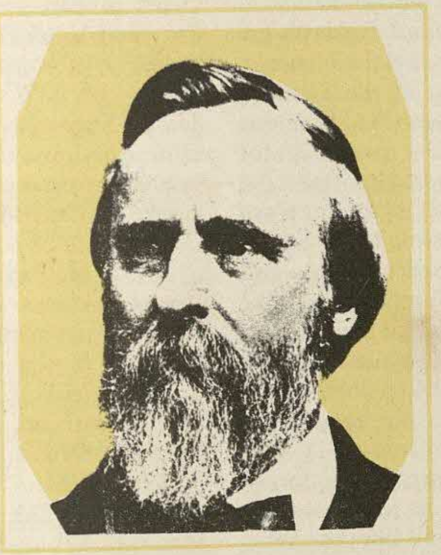


FATHER OF THE SYMPHONY
Franz Joseph Haydn, famous composer.

HAYDN, *hi'd'n,* **FRANZ JOSEPH (1732-1809). "Papa Haydn," as the students of this Austrian composer called him,** put all his cheerfulness and good spirit into his music. He insisted on and composed some of the world's most beautiful and melodic music. He wrote hundreds of musical pieces, covering all musical forms. But it is for his symphonies and quartets that he is most famous. In fact, he was the first of the great composers to use the symphony form as we know it today.

As a boy, Haydn left Rohrau, his birthplace, to sing in the choir of Saint Stephen's Church in Vienna. Later he was a teacher of music, and until 1790 was musical director for Prince Esterhazy. He made two trips to England between 1791 and 1795, where he published his *Twelve Grand Symphonies.* His finest oratorios are *The Creation* and *The Seasons.*

HAYES, Patrick Joseph (1867-1938). For years the chief Catholic prelate in the United States, Patrick Joseph Hayes became one of the few American members of the College of Cardinals. Born and educated in New York City, he received his religious training at Troy, N. Y., and at the Catholic University of America, and was then appointed to his first church in New York City. Father Hayes later became secretary to Archbishop Farley and served for several years as president of Cathedral College. He was made archbishop of the New York Diocese in 1919, and in 1924 was elevated to membership in the College of Cardinals, the governing body of the Roman Catholic Church.



RUTHERFORD BIRCHARD HAYES
Nineteenth President of the United States
Administration: 1877-1881
Republican policies were staunchly upheld by President Hayes, who was industrious and efficient as an executive. His policies did much to heal Civil War wounds in the South.

HAYES, Rutherford Birchard (1822-1893). In American politics, the name of Rutherford B. Hayes, nineteenth President of the United States, stands out, not as a great leader or a man who achieved all his ends, but as a man whose effort and sincerity prepared the groundwork for others to come after him. As a soldier and a statesman, he closely followed his principles of right; and when he stood in the nation's capital, surrounded by scandal and corruption among high public servants, he swerved not from his purpose to reunite a war-torn country and make its system of government again secure. These accomplishments brought him deserved fame.

Early Life. Hayes was born at Delaware, Ohio, Oct. 4, 1822. He received an excellent education at Kenyon College and at Harvard Law School and followed the legal profession in Cincinnati, Ohio. When the Civil War broke out, he helped to organize a military company and served as its captain. He rose to be brevet major general.

The records of his achievements on the battlefield point to qualities of honor and bravery far beyond mere daring. Even during the war, in 1864, he was elected to Congress from Ohio, but did not take the seat until after peace had been proclaimed. Then, he was elected governor of the state for two terms, at the end of which he retired. But four years later he was again elected. He hoped then to retire to private life.

His obvious popularity with the people of Ohio led the Republican party to realize that here was a man who might well be accepted as a national leader in a Republican era which was rapidly losing ground because of the scandals and intrigue that followed the Civil War.

The Election of Hayes. In 1876 Hayes won the nomination over such well-known Republican leaders as James G. Blaine and Roscoe Conkling. The Democrats and their candidate, Samuel J. Tilden, had strong support, and the Hayes-Tilden campaign has no parallel in the history of Presidential elections. Torchlight parades, soap-box orations, and even small riots were the order of the day. The last few days were tense with bitterness and excitement. Throughout the campaign, nevertheless, the candidates themselves maintained the greatest dignity and composure under all conditions.

The election was so close that the electoral vote was split 185 to 184 in favor of Hayes. Each party charged the other with fraud; so an Electoral Commission was appointed, and Hayes won the decision.

As President. Rutherford B. Hayes entered the White House with the intention of ending reconstruction in the South, a program which for ten years had been one of hardship, misery, and exploitation for those states which had seceded from the Union. He proceeded to carry out his plans by restoring self-government to the Southern states, withdrawing Federal troops, and ending "carpetbagging." Although these moves brought no immediate rewards and gained for him much unpopularity in the North, time has since shown their merit.

Of importance also was the resumption of specie payments on January 1, 1879. Paper money which had been issued during the Civil War was made redeemable in gold. At this time, pressure from the West and from the poorer classes was strong for establishing the silver dollar as the standard coin. In support of these views, Congress passed the Bland-Allison Act, requiring the Treasury to purchase from $2,000,000 to $4,000,000 worth of silver each month and to coin it into money. The President did not favor this action, but the bill was passed over his veto.

Hayes laid the foundation for the civil-service reforms and the commission on civil service which were to follow after the close of his administration, but which did not obtain the support of his Congress. Under this administration, too, the dispute over the Atlantic fisheries was settled, and the principle of arbitration was advanced. A commission on flood control of the Mississippi was set up in 1879.

Later Years. Although still a comparatively young man, Hayes refused to be a candidate for a second term. He spent his last years in government-reform movements and worked with various charitable enterprises. He died January 17, 1893, in Fremont, Ohio.

HAY-PAUNCEFOTE, *pawns' foot,* **TREATY.** The right of the United States to build a canal across the Isthmus of Panama was recognized by this treaty between Great Britain and the United States. Negotiated in 1901 by Secretary of State John Hay and Lord Pauncefote, British ambassador, it abrogated the Clayton-Bulwer Treaty of 1850 and provided that the United States should have exclusive control of the canal, and need not keep it open to all nations in time of war. However, in the course of normal business, equal rights and rates were to be accorded all nations.

In 1911 the Panama Canal Act passed by Congress exempted United States vessels from the payment of tolls. Great Britain, however, protested that this was contrary to the intention of the Hay-Pauncefote Treaty, and on the recommendation of President Wilson, the exemption was repealed in 1914.

HAZEL. The divining rod—a forked stick which some superstitious people believe can locate buried treasure and supplies of water—is selected from the hazel tree. Never reaching a great height, the tree is native to North America, Asia, Europe, and Northern Africa. It produces the hazelnut, or filbert, which is covered with a horny husk. After a frost, this husk opens, and the nut falls to the ground. Hazel leaves are smooth and rounded and turn a vivid yellow in the fall. The branches of the tree are strong and easily bent, making them ideal for basket weaving.

HEAD. See SKELETON.

HEALTH. Precious to man is health, a possession easy to retain, but just as easy to lose. To be strong, to be alert, free of sickness and ills, has been the desire of many men of wealth, fame, and wisdom. Health gives a person the opportunity to enjoy the good things in life, to make the most of his abilities, and to be an asset to his family and community.

Health, technically, is the state of well-being in which all the organs of the body perform their functions efficiently and without distress. Of course, few persons possess perfect health, but it is possible for the normal person to enjoy a happy life with a minimum of illness and pain. The following rules, known as the Ten Golden Rules of Health, will help young people to retain this priceless possession:

(1) Play hard and fair. Try to win. Be loyal to your teammates and generous to your opponents.

(2) Keep your weight up to the standard for your height and age. Drink fresh milk. Eat some green vegetables or fresh fruit every day. Eat slowly. Do not eat between meals. Chew food thoroughly. Never drink water when there is food in the mouth. Drink water several times during the day.

(3) Brush your teeth at least once a day. Rinse the mouth out well with water after each meal.

(4) Be sure your bowels move at least once a day.

(5) Keep clean—body, clothes, and mind. Wash your hands always before eating. Take a warm bath with soap once or twice a week, a cool sponge (or shower) bath each morning before breakfast, and rub your body to a glow with a rough towel.

(6) Try to keep your companions, especially young children, away from those who have contagious diseases.

(7) Use your handkerchief to cover a sneeze or cough, and try to avoid coughing, sneezing, or blowing your nose in front of others.

(8) Study hard—and in study, work, or play do your best.

(9) Sleep. Get as many hours in bed each night as the table indicates for your age. Keep windows in bedroom well open.

The hours of sleep and time in bed for different ages are shown in the following table:

Age		*Hours in Bed*
4 to 6 years	13 hours	6:00 p.m. to 7 a.m.
6 to 8 years	12 hours	7:00 p.m. to 7 a.m.
8 to 10 years	11½ hours	7:30 p.m. to 7 a.m.
10 to 12 years	11 hours	8:00 p.m. to 7 a.m.
12 to 14 years	10½ hours	8:30 p.m. to 7 a.m.
14 to 16 years	10 hours	9:00 p.m. to 7 a.m.
16 to 18 years	9 hours	10:00 p.m. to 7 a.m.

(10) Be cheerful; do your best to keep your school and your home clean and attractive, and to make the world a better place in which to live.

Even though a person of any age feels that he is in good health, it is wise to undergo a complete physical examination at least once a year. In this way, defects that are not readily apparent may be detected and corrected before it is too late.

HEALTH, Boards of. Looking after the public health is one of the vital functions of the community, the state, or the nation. Boards of health are groups of persons appointed or elected to perform the duties that are necessary for the health of the people within their jurisdiction. Among other duties, they enforce vaccination ordinances, set up regulations as to quarantine, and compel the observance of laws regarding private and public sanitation, such as rules concerning the accumulation of garbage. In a large city the board of health may be a part of the general department of public health, with a health commissioner in charge.

The Public Health Service of the United States is an agency in the Federal Security Agency. It is under the direction of the Surgeon General.

HEARING. See Ear.

HEARST, William Randolph (1863-1951). At the height of his influence, William Randolph Hearst owned more newspapers than any other American publisher. During the depression years, however, his fortunes waned, and through enforced sales and consolidation his great chain of papers, reaching from coast to coast, became greatly curtailed. Hearst's style of opinionated writing and use of scare headlines brought upon him the stigma of adopting "yellow journalism." On the other hand, he made a practice of employing the best special writers available, and his syndicated columns are widely read.

The son of a California Senator, Hearst was born in San Francisco. He attended Harvard University, graduating in 1885. He then entered journalism by taking over the management of the San Francisco *Examiner*, which his father owned. Hearst purchased the New York *Journal* in 1895, and within the next four decades built up his great chain of papers and magazines. The latter include *Good Housekeeping, Hearst's International-Cosmopolitan,* and *Harper's Bazaar*. Other fields which attracted his efforts include radio, motion pictures, ranching, and the hotel business. His International News Service is a world-wide news-gathering and picture agency.

Earlier in his career, Hearst was fired by personal ambitions in the field of politics, and he used his papers to further his plans, even aspiring to the Presidency. He served two terms in Congress as a Democrat (1903-1907). In 1905 he was an unsuccessful candidate for mayor of New York, and in 1906 was defeated for governor of New York by Charles Evans Hughes. Hearst's papers have not been consistently Democratic, but have supported men of different parties. In international affairs they have been strongly isolationist. Although he supported Franklin D. Roosevelt in 1932, Hearst later became an opponent of the "New Deal."

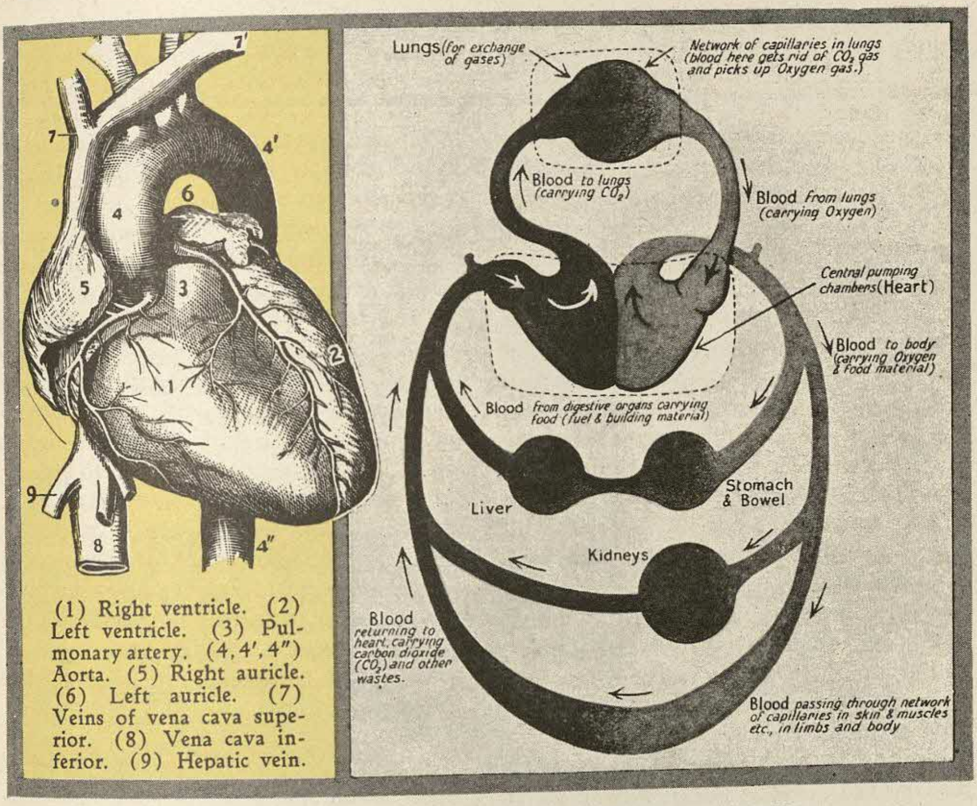
HEART, *hart.* Seventy-two times a minute, hour after hour, day after day, year after year, the heart beats. It begins working before we are born, and it stops only when we die. Whether we are awake, asleep, walking, talking, resting, working, eating, it goes on pumping, resting only for an instant between each "beat." It never takes time out for repairs, and always sends, as long as it is able, every drop of blood coursing through the arteries and veins of the body every six minutes. It is the mainspring of life, and is easily the most wonderful and amazing machine in the world.

In man, the heart is located slightly to the left of the center of the chest. Shaped roughly in the form of a cone, its apex points down and slightly to the left. The heart is about five inches long, about three and one-half inches at the widest point, and weighs about eleven ounces in men and nine ounces in women. A thin membrane called the *pericardium* covers and protects it. The cavities are also lined with a fine membrane known as the *endocardium.* Muscle fibers compose the walls of the heart; one wall, called the *septum,* forms a partition between the right and left sections.

Each side of the heart has an *auricle* and a *ventricle,* which are cavities comparable to receiving and shipping rooms. The blood comes in to the right receiving room (right auricle) by the *superior* and *inferior venae cavae.* It then flows downward through a valve called the *tricuspid* and enters the "shipping room" (right ventricle). From there it passes through another valve, called the *semilunar* valve because of its half-moon shape, and enters the *pulmonary arteries,* which take it to the lungs. After receiving its load of oxygen from the lungs, the blood becomes a rich crimson and comes back to the heart, entering the left receiving room (the left auricle) through the pulmonary veins. It then flows into the left shipping room (the left ventricle) through the *bicuspid,* or *mitral,* valve, and is sent through another semilunar valve to the "distribution department," the *aorta,* which takes it to the network of arteries.

The contraction of the ventricles is what gives the heart the power to send the blood out through the arteries. This is the beat of the heart, and the relaxation of the ventricles from this squeezing is the only rest the heart gets. When a physician listens to one's heart through a stethoscope, he listens to the valves opening and closing. The hearts of animals work in much the same manner as those in men and women, but they may be smaller or larger and may have different shapes. Small animals and children have a rapid heart beat; that is, their hearts pump faster and have less rest between beats than do those of adults.

Since the only rest the heart gets is between beats, the faster the heart has to pump, the more energy will be used, and the rest period will not be sufficient to restore it. It is necessary, then, that adults in particular should indulge only in exercise and work that will not overburden it. Strenuous exercise, hard manual labor, alcohol, and tobacco tend to make the heart beat faster; excessive exercise or use of stimulants will eventually weaken it. Because strenuous modern life is such as to tax this organ unduly, diseases of the heart lead all others in the United States, where, in a recent year, deaths from that cause were more than twice those from any other cause. See Circulation.


7'
7
4'
6
4
5
3
2
1
9
8
4"
Lungs (for exchange of gases)
Network of capillaries in lungs (blood here gets rid of CO₂ gas and picks up Oxygen gas.)
Blood to lungs (carrying CO₂)
Blood from lungs (carrying Oxygen)
Central pumping chambers (Heart)
Blood to body (carrying Oxygen & food material)
Blood from digestive organs carrying food (fuel & building material)
Stomach & Bowel
Liver
Kidneys
Blood returning to heart, carrying carbon dioxide (CO₂) and other wastes.
Blood passing through network of capillaries in skin & muscles etc., in limbs and body

(1) Right ventricle. (2) Left ventricle. (3) Pulmonary artery. (4, 4′, 4″) Aorta. (5) Right auricle. (6) Left auricle. (7) Veins of vena cava superior. (8) Vena cava inferior. (9) Hepatic vein.

THE NEVER-CEASING PUMP THAT KEEPS US GOING

It is the duty of our hearts to maintain the circulation of the blood through our bodies. Left, the pump itself. Right, how the blood circulates through heart, lungs, and the various organs.

HEAT, *heet.* The nature of heat was once rather mysterious. Early scientists called it a "subtle fluid." Today we know that heat is a form of energy. The tiny molecules of which any body is composed are in constant motion, and the energy of their motion is heat.

When a piece of steel is heated in a flame, molecular energy passes from the flame to the steel molecules, which are set into intense vibration. When the steel cools, the energy of the molecules passes to the substances surrounding it. Those who have seen a white-hot piece of iron taken from a forge and have observed the hissing particles, like little skyrockets, projected from its surface, may easily imagine the intense vibration within the iron.

Sources of Heat. The greatest source of heat is the sun, which makes life possible on our planet. Geysers and active volcanoes supply heat from the earth itself. Fire, which is produced by the chemical union of wood or coal or gas with oxygen, is one of the most important sources of heat, and the basis of all industrial progress. The resistance which a metal wire offers to the passage of an electric current produces intense heat. Mechanical action against friction is another source of heat.

Measurement of Heat. The *intensity* of the heat of a substance, which depends on the speed of motion of its molecules, is said to be the temperature of the substance and is measured in degrees by a thermometer. *Quantity* of heat is measured in the metric system by the *calorie* (see CALORIE) and in the English system by the *British thermal unit* (*B.T.U.*). A small amount of a substance may be as warm as a large amount of the same substance, but the latter will have a greater *quantity* of heat, capable of lasting longer and heating greater areas.

The relation of work to heat is known as the *mechanical equivalent of heat.* The amount of work necessary to raise a weight of 778 pounds to a height of one foot would be equal to the amount of heat necessary to raise the temperature of a pound of water 1°F., if the work were converted into heat.

The *thermal capacity* of a body is the amount of heat in calories or B.T.U. that the body absorbs when its temperature is raised by one degree (1°C. for calories; 1°F. for B.T.U.). Water is capable of absorbing more heat than almost any other substance and is used as the standard against which the thermal capacities of all other substances are compared. The relative comparison is called the *specific heat* of a substance. The temperature at which solids melt is known as the *melting point,* and the amount of heat a melting substance absorbs before its temperature begins to rise is called the *heat of fusion.*

Heat and Health. The normal temperature of human bodies is 98.6°F., and variations of as little as one degree above or below normal are often indications of sickness. The amount of clothing worn should be enough to give the body a comfortable feeling of warmth. Warm, dry air tends to draw too much moisture from the body; and warm, humid air containing too much moisture is unpleasant because it hinders evaporation of sweat, which cools the body.

In artifically heated houses a temperature of about 68°F. is considered the best for normal, healthy people.

How Heat Travels. Heat travels in several ways:

(1) *By Conduction.* If a metal poker is plunged into hot coals, the hand holding the poker will become warm. The metal has conducted the heat from the source to an object remote from the source.

(2) *By Convection.* Heating buildings by pipes containing hot water or hot air is one application of convection, the transfer or transmission of heat. Convection depends on circulation and is, therefore, possible only in fluids.

(3) *By Radiation.* Heat comes by radiation from the sun, grates, hot stoves; in fact, from anything which is hot. Heat from radiation is much more noticeable close to the source than at a distance; the amount of heat an object absorbs from a source of radiation varies inversely as the square of the distance from the source.

The Effect of Heat Upon Objects. Most substances increase in size when heated, the expansion being easily detected. When heat is applied to a thermometer, the liquid expands and fills the tube of the instrument. Not only does heat change solids to liquids, but it changes liquids to gases and vapor. Vapor occupies more space than does a solid, and the force caused by its expansion may be very great. For example, the pressure of steam generated in a boiler is the force which runs a steam engine.

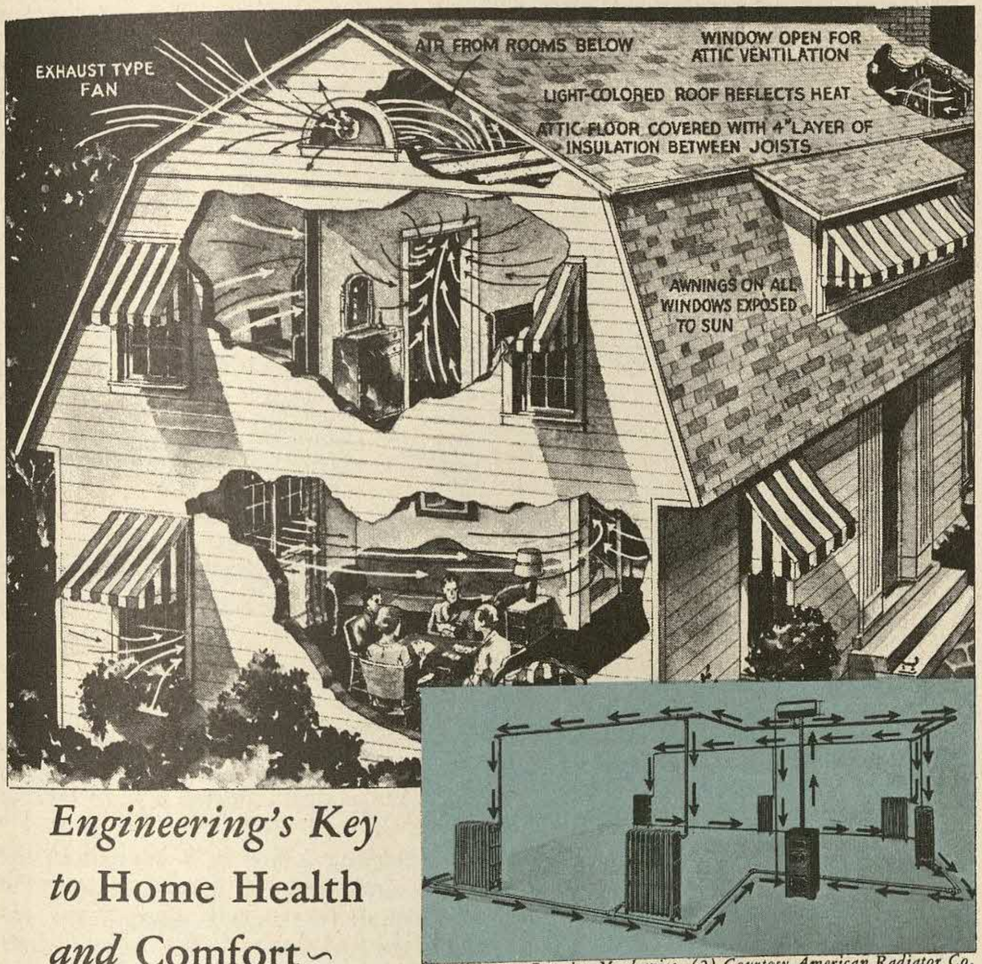
Consult the following titles for further information:

Combustion
Fire
Fuel
Fusion
Heating and Ventilation
Temperature
Thermometer

HEATH, *heeth,* **or HEATHER,** *heth'ur.* Occupying a prominent position on the coat of arms of many Scottish clans is the heather. Covered with many minute purple flowers, Scotch heather, called *ling,* is a low evergreen plant with sharp-pointed leaves, gray stalks, and broomlike branches. The poorer Scottish farmers use the plant to thatch the roofs of their cottages and to make brooms and brushes.

Heather is native to Europe and South Africa. There are about 400 species, many of which have brightly colored blossoms. One species has been introduced in North America and is found along the Atlantic coast. Other members of the family include the azalea, cranberry, rhododendron, and trailing arbutus.

The long waste stretches in Scotland and England on which heather grows are called heaths; the term is now rather generally applied to any uncultivated area covered with low bushes and wild grasses.


EXHAUST TYPE FAN
AIR FROM ROOMS BELOW
WINDOW OPEN FOR ATTIC VENTILATION
LIGHT-COLORED ROOF REFLECTS HEAT
ATTIC FLOOR COVERED WITH 4" LAYER OF INSULATION BETWEEN JOISTS
AWNINGS ON ALL WINDOWS EXPOSED TO SUN

Engineering's Key to Home Health *and* Comfort

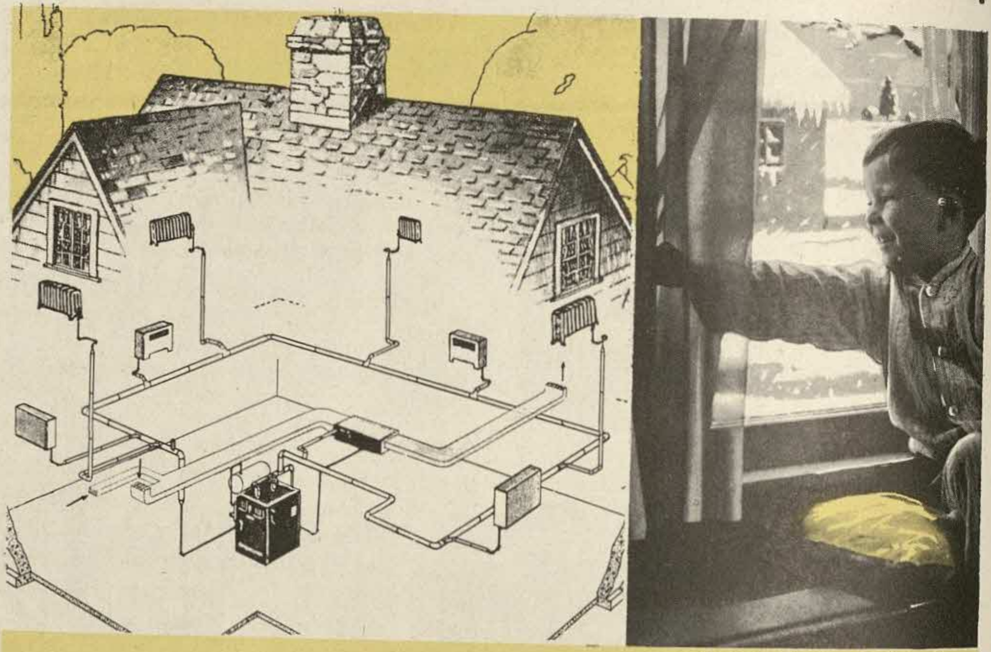
(1) Courtesy Popular Mechanics. (2) Courtesy American Radiator Co.

A well-designed and ventilated home has even-temperature air moving continuously (above). A simple hot-water system (right) heats it.

HEATING AND VENTILATION. Man can do little more about the weather out of doors than to dress to suit it. Indoors, he has now learned to make his own weather. At first, he only worried about keeping warm. It has been only in the last few years that he has begun to produce for himself year-round comfort—to cool his home in summer and warm it in winter; to add moisture to the indoor air in winter; to keep fresh air circulating at a constant temperature; and to clean the air of soot, dust, and smoke.

One cannot live healthfully in a closed room. There must be a steady supply of fresh air containing necessary oxygen. Any heating and ventilation system must include a method of bringing fresh air indoors and keeping it at the most comfortable temperature.

Temperature is only one phase of comfort. The temperature must remain constant, but a breeze would produce a feeling of coolness, or an increase in the moisture content of the air would make it seem warmer. That is why electric fans are used in summer, and why we try to add moisture in winter and withdraw it in summer. Other methods are also used to resist outdoor temperature, including insulation in the walls (air pockets, paper, rock wool)



Courtesy American Radiator Co.

THE REFRESHING AIR OF MAYTIME ALL THE YEAR AROUND

Left, an efficient furnace to warm the radiators, plus a conditioner for the air, mean comfort and health. Draftless modern homes keep colds from the door, smiles on faces.

and weather stripping around doors and windows.

Fireplaces. The principle of the fireplace has long been employed by man. When he built a fire in a cave, a large opening was provided above the flames for circulation of air and elimination of smoke. Later he warmed his tepee with fire, and the smoke rose to a vent in the peak and drifted away. Gradually the idea of the fireplace was developed. The advantages of a fireplace are the low cost of installation and upkeep and the ventilation which is provided through its operation. Of course, considerable heat escapes up the chimney, and the uneven heat and low efficiency are not in its favor.

Stoves. The next step in heating equipment was the stove, which conserved some of the heat that formerly escaped up the fireplace chimney. Air coming into contact with the warm stove expands, and, in so doing, becomes lighter and rises to the ceiling; the cold air near the floor flows in toward the stove and in turn is warmed. As the warm air cools, it sinks toward the floor and is again drawn toward the hot stove.

In starting a fire in a stove, open the lower draft and the damper, closing the check draft (the small opening in the center of the fuel door). When the main draft is closed, the damper partially closed, and the check draft opened, the fire will burn slowly because the circulation of air through the stove has been retarded.

Furnaces. Stoves were convenient enough for small houses in which it was not necessary to have all the rooms heated to an even temperature. The cost of fuel for large houses, however, was very high. A solution to the problem was found by placing one central stove, or furnace, in the lower part of the house and piping heat to each room. By installing furnaces, the dirt created by heating units was largely removed from the living quarters, and more even heat was produced.

Fuels. Most modern furnaces use gas or oil. These fuels provide automatic heat through the use of a thermostat that turns the heat off and on according to room temperature. Other commonly used fuels are coal and coke. Electricity is used where rates are low enough.

Ventilation. The problem of how to keep warm or keep cool and at the same time provide a constant supply of fresh air is of utmost importance to life indoors. Foul air must be replaced by pure air without drafts. A total of about 1,800 cubic feet of fresh air every hour is needed by a healthy person. By throwing open the windows, one can bring about a change of air; but, at the same time, a draft may be created. In large buildings, before the advent of air conditioning, the *plenum* system of ventilation was used. Fresh air was forced in by large blowers.

Air Conditioning. Manufacturing "air" to suit the occupants of a room is now a reality. Air conditioning is today practical for mammoth buildings or for private dwellings. The ordinary system consists of a conditioning apparatus; a fan to force a draft of air; a conduit system for carrying the air to various outlets; a return conduit system for returning used air to the conditioning chamber; an outlet for additional air to the conditioning chamber; a water spray for cleaning air and increasing or reducing moisture in the air and for cooling it in the summer; a steam-heating unit for winter; an air filter to remove impurities; and sometimes a refrigerating mechanism to cool the sprayed water in hot weather.

The Thermostat. In both heating and ventilating, the thermostat plays an important part, for it "feels" the atmosphere and regulates drafts, opens and closes valves, and maintains an even temperature. With the advent of automatic fuel feeders for furnaces and the thermostat as the watchman, heat and fresh air require little more than the touch of a button.

For additional information, consult the following articles:

Fire
Fuel
Furnace
Heat
Stove
Thermostat

HEBREW LANGUAGE AND LITERATURE.

"The Lord is my shepherd; I shall not want.
"He maketh me to lie down in green pastures: he leadeth me beside the still waters.
"He restoreth my soul: he leadeth me in the paths of righteousness for his name's sake.
"Yea, though I walk through the valley of the shadow of death, I will fear no evil: for thou art with me; thy rod and thy staff they comfort me.
"Thou preparest a table before me in the presence of mine enemies: thou anointest my head with oil: my cup runneth over.
"Surely goodness and mercy shall follow me all the days of my life: and I will dwell in the house of the Lord forever."

This, the twenty-third *Psalm*, and the most famous in the Bible, is an example of the rich beauty Hebrew literature has given the world. In this and other passages of the Old Testament may be found majesty of style and clearness; and the very fact that constant repetition has not destroyed the grandeur is proof of the timeless quality of this ancient Semitic tongue.

Like other languages, Hebrew underwent changes in its long history, but in the period between 1200 B. C. and 200 B. C., approximately the time the greater part of the Old Testament was written, there was little alteration.

But, in the spoken language, the influence of the Babylonians was felt permanently. A corruption of the pure Hebrew remained even during the time of the Jews' freedom, and was called Aramaic. It was the language of Jesus and His followers. Those books of the New Testament which were written in the spoken tongue of the Jews were in Aramaic and not pure Hebrew.

Even though the spoken Hebrew underwent a permanent change, the writings of the Jews continued to be in the classical style. The *Mishna*, a history of the Jews combined with an interpretation of the Bible, was written in the second or third century A. D., and discussions of it led to the *Palestinian Talmud* in the fourth century, and the *Babylonian Talmud* about a hundred years later. During the Middle Ages, the pure Hebrew continued to be

THE ILL-FATED PRINCE OF ANCIENT TROY BIDS A LAST GOOD-BYE
When Hector, son of Priam, king of Troy, set out to meet the attacking Grecian host, he left behind him the beautiful Andromache. He died in battle, slain by Achilles.

the language of religious writings, and a slightly corrupted *Rabbinical* Hebrew was spoken in the houses of worship.

The Hebrew alphabet today has twenty-two consonants, and the vowels are signified by marks above and below the letters. Like the Phoenician, Hebrew is read from right to left, instead of left to right, and differs from other languages also in that there is no neuter gender. See ALPHABET; JEWS.

HEBREWS. See JEWS.

HEBRIDES, *heb're deez,* **or WESTERN ISLES.** The Hebrides form a chain of small islands off the west coast of Scotland. The islands are largely mountainous, and the soil is poor. Although there are more than 500 islands, only one fourth of them are inhabited. They are part of four counties of Scotland: Argyll, Bute, Inverness, and Ross and Cromarty. Potatoes, turnips, oats and barley are the chief crops; the occupations are fishing and the raising of sheep and cattle. A Gaelic dialect is spoken; and the people, because of their isolation, have not kept up with the changes in the modern world. The population of the islands is about 80,000.

HECTOGRAPH, *hek' toh graf.* See COPYING DEVICES.

HEC'TOR. Bravest warrior of the Trojans was Hector, according to the *Iliad,* the great epic poem which describes the long wars between the Greeks and Trojans. It was Hector who slew Patroclus. To avenge the slaying of his friend, Achilles, the Greek hero, killed Hector. He then tied Hector's body to his chariot and dragged it around the walls of Troy. But Priam, Hector's father, retrieved his son's body and buried it with honor. A beautiful part of the *Iliad* is devoted to the parting of Hector and his wife, Andromache, before he set out to wage his last battle with Achilles. See ACHILLES.

HEDGEHOG, *hej'hog.* A relative of the common American porcupine, the hedgehog is a small, quilled rodent which lives in Europe, Western Asia, and Africa. Its quills, which are the most noticeable feature, are extensions of long hairs; and the animal can roll itself into a ball, quills outward, thus defying almost any enemy.

Hedgehogs are about ten inches long, with a tapering nose and short ears. They feed on rootlets, insects, eggs, mice, and frogs, rooting around on the ground for their prey. They live in hedges and thickets. See PORCUPINE.

HEDJAZ, *heh jahz′,* **or HEJAZ.** Now a part of Saudi Arabia, Hedjaz was formerly a separate Arabian kingdom. A narrow strip of land on the eastern shore of the Red Sea, it is noted for its two holy Mohammedan cities—Mecca and Medina. See ARABIA.

HEGIRA, *hej′e rah,* or *he ji′rah.* On July 16, 622, Mohammed fled from Mecca to Medina, and this flight was called the Hegira. In about the year 639, the Caliph Omar created a new calendar beginning on the first day of the first month of the year in which the flight occurred. The Mohammedan lunar year is about eleven days shorter than ours.

To find the approximate year of our calendar corresponding to a Mohammedan year, subtract from the latter one thirty-third of itself and add 622. For example, our year 1937 corresponds to 1356 in the Mohammedan calendar. (1356-41+622=1937). To determine the exact year and day, multiply the given Mohammedan year by 970,224, mark off six decimal figures, and add 621.5774. The whole number in the result is the year of the Christian Era, and the day is found by multiplying the decimal figures by 365.

HELEN. The gods fought other gods, and Greek struggled with Trojan because of a beautiful woman, the *Iliad* of Homer relates. This woman was Helen.

Daughter of Zeus and Leda, she was sought by many men as a bride, but she married King Menelaus of Sparta. All went well until Paris, handsome young son of King Priam of Troy, went to Sparta. He fell in love with Helen and, while Menelaus was away, carried her back to Troy. When Menelaus returned to find his lovely wife gone, men and gods and goddesses joined him to bring her back, and a vast army set sail for Troy. Other gods and goddesses fought on the side of the Trojans, but the Greeks were superior; Paris was killed, and Troy was destroyed. Helen was taken back to Sparta by Menelaus and is said to have been murdered sometime later. See MYTHOLOGY.

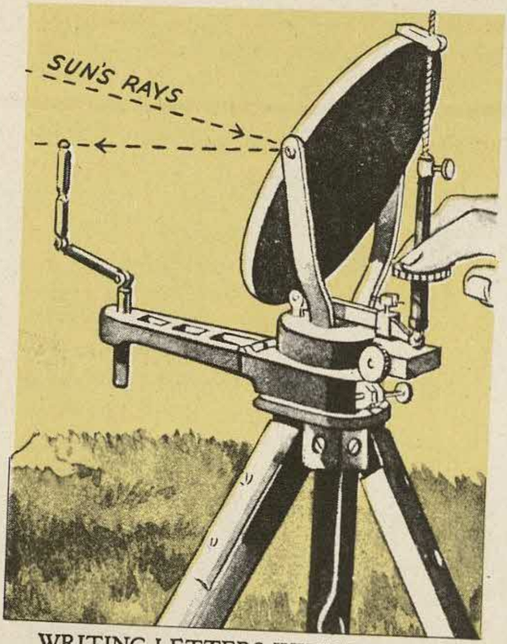
Through the centuries, Helen has remained a symbol of beauty—

A daughter of the gods, divinely tall,
  And most divinely fair.

HEL′ENA, MONT. Since the miners first made it their headquarters after the discovery of gold in the surrounding region in 1864, Helena, the capital of Montana, has been the center of the state's extensive mining industry. In addition to gold, large deposits of copper, iron, and silver were found; and, with the development of these deposits, Helena grew to be a flourishing city. One of the most important industries is the smelting of copper, and there are large manufactures of mining machinery and equipment, as well as numerous machine shops. Helena is also the center of an agricultural region that produces wheat, rye, and sugar beets; and in the city there are flour mills and sugar refineries.

With many large buildings and several beautiful parks, Helena is a modern city. Here are located the capitol and other state government buildings and also Carroll College, the only Roman Catholic college for men in the state of Montana. Helena was made the capital of the territory in 1874, and in 1881 it was incorporated as a city. The population of Helena today is about 20,500.

HELGOLAND, *hel′go lahnt,* **or HELIGOLAND.** Swept by fierce storms in the winter and covered with dense fogs in the spring, the two tiny islands that make up Helgoland lie in the North Sea only a short distance from the mouths of the Elbe and Weser rivers of Germany. The islands are rocky, with steep, red cliffs facing the sea on all sides, many of which have been carved into fanciful shapes by the battering sea waves. Until 1814, Helgoland was a possession of Denmark, but in that year it was ceded to Great Britain. It remained under British control until 1890, when it was ceded to Germany in return



WRITING LETTERS WITH THE SUN

The heliograph is a movable mirror attached to a key. By catching the sun's rays and moving the mirror, men send signals.

for Zanzibar in East Africa.

Germany made the islands a strong naval base. Here was fought the Battle of Helgoland, the first great sea battle between Germany and Great Britain in 1914. The Versailles Treaty forced Germany to demolish the fortifications, but in 1936 Helgoland was refortified. In the Second World War it was again in use as a German naval base.

HELIOGRAPH, *he′le o graf,* or **HE′LIOSTAT.** If you take a small mirror and adjust it at such an angle that sunlight is reflected from it to some other spot, you will have made a simple heliograph, an instrument for reflecting the sun's light over a distance. Such contrivances are often used in transmitting time signals.

The mirror is usually arranged in such a way that the flash of light occurs at a set hour. The receiver, perhaps more than 200 miles away, can, under favorable atmospheric conditions, get an accurate reading in regard to time. Heliographs are sometimes used for signaling in war. The United States Coast and Geodetic Survey has found this instrument valuable in measuring great distances by means of triangulation.

The *heliotrope* is a heliograph fitted with clockwork, causing the mirror to move with the sun and cast a continuous beam of light in one direction.

HELIOPOLIS, *he le op′o lis.* The present village of Matariah, located a little north of Memphis in Egypt, was once a city known to the ancient Greeks as Heliopolis. There were built some of the famous obelisks, including the two known as Cleopatra's Needles, one of which now stands in Central Park, New York City. The Pillar of On, reputedly the oldest obelisk, is sixty-seven and one half feet high and six feet broad at the base.

Heliopolis, whose name means *City of the Sun,* has at various times been called On, Rameses, and Beth-Shemesh in the Hebrew Scriptures. Under the Pharaohs it was very influential, and later, under the monarchy, it had famous schools of learning which were visited by the Greek scholars, Eudoxus and Plato. In this city Joseph, Mary, and the infant Christ are supposed to have rested during their flight into Egypt.

HELIOTROPE, *he′li o trope.* Of all flower fragrances, many persons believe that the scent of heliotropes is the most pleasing and delicate. The lovely flowers are dark purplish blue, heliotrope, or pure white, and they are produced in clusters which face one direction. The plants are really shrubs, but they may be raised from seed and brought into bloom in one year. Since they will not stand the winter, as they are not hardy, they are placed in a sunny room or a greenhouse for the winter. The plants are trained in tree form or treated as a vine upon a small trellis. The heliotrope likes the full sunshine, but when it is growing indoors, the temperature should not be allowed to rise much above 45°F. during the winter months.

HELIOTROPE, or BLOODSTONE. A variety of quartz similar to jasper or chalcedony, heliotrope is a dark-green mineral used as a semi-precious gem. Because it is marked with bright-red spots, it is also called bloodstone. The finest specimens are found in Asia and Scotland. Pliny, historian of ancient times, has recorded a belief that the heliotrope, if submerged in water, will turn the sun's rays into red reflections. Hence the name, from the Greek word *helios,* meaning *sun.*

HE'LIUM. The most important things about the element helium are that it is buoyant, colorless, and non-inflammable. Consequently, this gas is an excellent substitute for hydrogen, the most buoyant, but inflammable, gas. Though helium weighs nearly twice as much as hydrogen, its lifting power is ninety-two per cent as great. Its melting point is –262.2° C.

How Helium Is Obtained. The chief source of helium lies in immense natural gas reserves in the ground. The process of obtaining the helium is as follows: As natural gas is compressed and cooled, the hydrocarbons liquefy first and are removed. Next comes nitrogen in liquid state and, finally, helium. Most natural gas contains but one per cent helium, but in Colorado a natural gas was recently found that yielded eight per cent. Texas, Oklahoma, and Kansas also contribute heavily to the production of helium. At present, the United States has a virtual world monopoly on helium.

The United States government maintains a large plant at Amarillo, Tex., where helium is refined and shipped to the various military flying fields by pipe lines and tank cars. The cost of the gas during World War I was as much as $3,000 per cubic foot; mass production has reduced the cost to less than one cent per cubic foot.

HEL'LESPONT. See DARDANELLES, THE.

HELMHOLTZ, *helm'hohlts,* HERMANN VON (1821-1894). One of the world's greatest physicists, Hermann von Helmholtz is best known for his studies in acoustics and optics, closely related to the realm of physiology. Born at Potsdam, he was educated in Berlin. In 1849 he accepted the chair of physiology at Königsberg, later transferring to similar posts at Bonn and Heidelberg.

In 1871 he returned to Berlin as a professor of physics; and through his work Berlin became the world center for experimental physics. The most famous of his writings are *Manual of Optics, The Conservation of Force,* and *Popular Lectures on Scientific Subjects.*

HELOISE, *a lo eez'.* See ABELARD.

HELOTS, *hel'ots,* or *he'lots.* Men of ancient Greece were free from the worries of routine work because they kept slaves. In Sparta, the great military power and rival of Athens, the slaves were known as Helots. These Helots were owned by the state and were apportioned to the citizens to till the soil and do other manual labor.

The Helots, who were made up of captives, also had to serve in the army on occasion; during the Peloponnesian War, they were given their freedom for their bravery. But, despite frequent rebellions, they were enslaved again, finally being liberated entirely by Epaminondas, the Theban statesman and commander, when that city conquered Sparta in 371 B. C.

HEM'ATITE. Most of the world's iron ore is made up of hematite, the red oxide of iron. It occurs almost everywhere in small quantities. Its presence in small amounts gives the red color to rocks and soils. When it is crystallized with water it is *limonite,* which is yellow, and which gives the yellow tints in most natural landscapes. These two minerals are the most common natural pigments. When they are taken into the cells of plants, they combine to give the green of the fields and forests and the yellow, red, and brown of autumn.

Hematite and limonite are the cheapest paint pigments, and when properly prepared are known as *umber, sienna,* and *ocher.* Red barns owe their color to the cheapness of hematite paint. See IRON.

HEMISPHERE, *hem' is feer.* Like an orange cut in half, the earth is figuratively divided into two hemispheres by an imaginary line, the equator. North of this line is the Northern Hemisphere; the Southern Hemisphere is south of the equator. Geographers sometimes divide the earth into Eastern and Western hemispheres, the Eastern being composed of Asia, Europe, Africa, and Australia, and the Western of North and South America. Land and water hemispheres are other geographical divisions of the globe.

HEM'LOCK. A celebrated poison of antiquity was obtained from the hemlock, a white-flowered member of the parsley family found in damp or marshy places. It is said that the poison of this plant was taken by Socrates when he was condemned to death.

Hemlock has a shiny stem and divided leaves with purplish spots, which emit a disgusting odor when injured. The flowers themselves form small clusters. Growing in the United States, Europe, and the cooler parts of Asia, the hemlock produces medical products of some value.

HEMLOCK, or HEMLOCK SPRUCE. Four beautiful evergreens make up the America genus of hemlocks, trees of the pine family. The hemlock of Longfellow's *Evangeline* grows naturally from Nova Scotia to Eastern Minnesota and southward through Michigan and Wisconsin, and along the Appalachian Mountains to Alabama. It makes its largest growth in the mountains of North Carolina and Tennessee. The western hemlock occurs from Southern Alaska to Central California, and as far east as Idaho. The heaviest stands of western hemlock are found west of the Cascade Mountains in Washington, Oregon, and north into the province of British Columbia.

The lumber of hemlock generally is not much in favor because of the poor quality of material from the eastern tree. The western hemlock, however, is thought well of for certain uses. It makes excellent flooring and can be used for many purposes where it is not exposed to moisture.

The bark of the hemlocks is valuable because tannin can be extracted from it. Over 1,000,000 cords of hemlock bark have been gathered in one year for use in the tanning industry. Probably the greatest use of hemlock in the future will be in making paper pulp.

HEMOGLOBIN, *hem o glo'bin.* The red color of blood is caused by a substance known as hemoglobin. Found only in the red corpuscles, it contains iron and carries oxygen from the lungs to the body tissues. See Blood.

HEMP. Strictly speaking, hemp is the bast fiber produced by the hemp plant. Unfortunately, the name hemp in English, and its equivalents in other languages, are used not only in their correct and definite meaning to designate the true hemp, but also in a kind of generic sense, as a partial synonym for *fiber,* to designate nearly all long fibers except flax, which is most nearly like hemp. This double use leads to endless confusion.

Description. The hemp plant is an annual, with slender herbaceous stalks four to twelve feet high, one half inch or less in diameter, and without branches if grown broadcast for fiber; or up to two inches in diameter, ten to twenty feet in height, and with numerous spreading branches if grown in hills or drills for seed production.

The fiber is four to eight feet long, gray if dewretted and creamy white and soft in texture if water-retted; it is often in the form of very narrow, flat ribbons capable of subdivision to hairlike fineness. Some of the fibers extend through the length of the stalk, but some are branched and some terminate at each node.

Regions of Cultivation. Hemp is grown in cool, moist temperate regions throughout the world. It requires a growing season of about four months for fiber and five and one-half months for seed. The bulk of world hemp production originates in Eastern Europe. In the United States, Texas, Georgia, and Alabama are major producers of hemp, and large crops are also grown in other states.

Uses of Hemp. In the United States hemp is used almost exclusively in the manufacture of commercial twines, seine twine, sail twine, sack twine, carpet warp,

THIS WILL BE ROPE SOON
Manila hemp, fiber from the abaca plant (right), has much the same uses as true hemp. The abaca is grown on plantations in tropical regions. Above, Manila-hemp market.

tarred marine cordage, heaving lines, marlines for seizing or winding ropes, and, broken into flax lengths and hackled on flax-hackling machines, either alone or mixed with flax, in the manufacture of coarse numbers of shoe thread and harness thread.

HEN HAWK, or CHICKEN HAWK. Almost any hawk which attacks poultry is usually called a hen hawk or chicken hawk. Sometimes quite innocent hawks are accused of menacing chickens and other livestock. One of the real offenders is the *goshawk*, which does destroy poultry. So do the *sharp-shinned* hawk and *Cooper's* hawk. All three also help the farmer by destroying animal and insect pests. The *red-tailed* hawk kills little poultry. The *red-shouldered* hawk rarely attacks poultry, though it is called the "hen hawk." It, too, aids farmers, for it destroys much vermin. Some of the smaller hawks sometimes kill chickens, but their attacks are rare. See HAWK.

HEN'NA. From the time of the ancient Egyptians, a coloring made from the dried leaves of the henna plant has been used in the Orient to dye the nails and tips of the fingers, as well as men's beards. The dye produces a rich, orange-red color and is used to some extent in the Western World to dye hair. The dye is produced by powdering the dried leaves of the plant and mixing with water and catechu to form a paste. Mixed with indigo, henna produces a jet black used for blackening horses' manes. Henna is also valuable for dyeing skins, furs, and leather. The plant is a native of North Africa and parts of Asia.

HEN'NEPIN, Louis (about 1640-1706). Seeking converts to the Catholic faith, Louis Hennepin, a Belgian missionary, came to America with La Salle in 1675. Although he is regarded in history as an explorer, many of the wild claims he made later in life were disproved.

Hennepin first attempted to convert the Indians at Fort Frontenac; then, with La Salle, he sailed across lakes Erie, Huron, and Michigan, up the Saint Joseph River and then down the Kankakee and the Illinois rivers. He helped build Fort Crèvecoeur near Peoria, and then went farther south. But he was captured by the Sioux Indians and taken up the Mississippi; upon escaping, he went to Quebec. Later he went to France, and never returned to America, although the Church wished him to do so. It was after La Salle died that Hennepin made claims of vast explorations and discoveries, which were never borne out. See La Salle, René-Robert.

HENRY, O. See Porter, William Sidney.

HENRY I (1068-1135). Youngest son of William the Conqueror, Henry I came to the throne of England by stealth. Riding in a hunt with William Rufus in 1100, Henry dashed to London when that prince was killed, and in the absence of his elder brother, Robert, Duke of Normandy, proclaimed himself king. He renewed the laws of Edward the Confessor and married Matilda, daughter of Malcolm III of Scotland, thus pacifying the Scots.

But Robert was not to be so easily duped, and invaded the country with an army to regain his rightful throne. He was placated with a pension and promised the throne upon Henry's death. But Henry broke his promise, invaded Normandy, captured Robert, and reduced his duchy. At the same time, Henry was successful in a struggle against France. As his successor he appointed his daughter Matilda, the wife of Geoffrey Plantagenet, Count of Anjou. See Henry II.

HENRY II (1133-1189). Succeeding Stephen as king of England, Henry was the first of the Plantagenet line. Son of Geoffrey of Anjou and Matilda, daughter of Henry I, he greatly reduced the power of the nobles and reorganized England's financial system. He attempted to bring the Church under the temporal authority of the king, and he conquered Ireland and was responsible for the first subjugation of Scotland. Always active in behalf of the common people, he divided England into judicial districts, constructed roads, destroyed the castles of lawless barons, and revived the right of trial by jury. Although the latter part of his reign was marked by the rebellions of his sons, Henry is considered by many to be oustanding among England's kings.

HENRY III (1207-1272). A wayward son of King John, Henry III came to the throne of England in 1216. As he grew to manhood, his character was seen to be ill suited to the high position he occupied, and the great barons of the country under Simon de Montfort took advantage of this fact and forced him, by the Provisions of Oxford, to surrender most of his power to them. When his son Edward I came to the throne, however, Edward regained the power seized by the barons.

In 1265, while Henry was still king, the first Parliament was held in which the commoners were represented. This Parliament marked the beginning of the House of Commons.

HENRY IV (1367-1413). Ascending the English throne upon the abdication of Richard II in 1399, Henry IV was the first of the Lancastrian line of rulers. He was the eldest son of John of Gaunt, and grandson of Edward III. The first years of his reign were troubled with rebellions, after which he ruled in comparative peace. During his reign, the first persecutions of the Lollards occurred. See Lancaster, House of.

HENRY V (1387-1422). Following a recklessly spent youth, Henry V, son of Henry IV, came to the throne of Eng-

land in 1413 and ruled with wisdom. During his reign a struggle between the Dukes of Orleans and Burgundy broke out in France, which gave Henry an opportunity of renewing the claims of former English kings to the French crown (see HUNDRED YEARS' WAR). Henry promptly landed with an army at Harfleur in August, 1415. After a struggle that cost him half his army, he captured the city and attempted to return to England via Calais. But on the way a large French army met Henry's forces at Agincourt. After a bitter fight, Henry was triumphant (October, 1415) and returned to England.

Shortly afterward, he again was compelled to invade France, after the defeat of his brother, the Duke of Clarence, in Normandy. He thoroughly trounced the French and entered Paris, where he forced Charles VI to name him as successor to the French crown. At about this time, a

ENGLAND'S OPPOSITE HENRYS

Henry V, medieval warrior king, was victor at Harfleur and celebrated Agincourt (top). But much-married Henry VIII (above) was a statesman and astute politician.

son was born to him; but just when everything pointed to a brilliant future, Henry died of fever. See Henry VI.

HENRY VI (1421-1471). The youngest king ever to succeed to the crown of England, Henry VI was made ruler upon the death of his father, Henry V, in 1422. As Henry was a mere infant, his uncle, Humphrey, Duke of Gloucester, was made protector of England; and another uncle, John, Duke of Bedford, was named regent of France. Shortly after Henry came to the throne, Charles VI of France died, and Henry became king of France in accordance with the Treaty of Troyes. War followed; and through the efforts of Joan of Arc and the death of the Duke of Bedford, England lost all her French claims except Calais.

In 1445 Henry married Margaret of Anjou. The marriage was unpopular and, coupled with other causes, led quickly to the Wars of the Roses. During these struggles Henry was several times taken prisoner by the Yorkists. He was deposed by Edward IV in 1461, and ten years later was murdered in the Tower, probably by order of Edward. Though gentle and well-meaning, Henry VI was a hopelessly unsuccessful ruler. See Joan of Arc; Roses, Wars of the.

HENRY VII (1457-1509). The first of the Tudor kings, Henry was crowned ruler of England in 1485 after Richard III was defeated and killed at Bosworth Field. Although his reign was marked by repeated uprisings, England fought no external wars. Henry curbed the power of the feudal barons and encouraged the development of the national resources. He was succeeded by Henry VIII.

HENRY VIII (1491-1547). Second of the Tudor line and son of Henry VII, Henry VIII rose to power upon the death of his father in 1509. It was during his rule that the Church of England and the Roman Catholic Church were separated.

Sought as an ally by both Charles V of Germany and Francis I of France, Henry represented England at a friendly meeting with Francis I in France in 1520 at the "Field of the Cloth of Gold," so-called because of its magnificence and splendor.

Affairs of state in the early part of Henry's rule were capably handled by Thomas Wolsey. Henry tired of his first wife, Catherine of Aragon, who was older than he and had borne him no living male heir. He therefore ordered Wolsey to find a means of divorcing her that he might wed one of her maids of honor, Anne Boleyn. Finding Wolsey's efforts of no avail, Henry turned the case over to the universities, who gave him his freedom in 1533.

Following the annulment of his marriage, he immediately married Anne. When the Pope refused to recognize either the annulment or the marriage to Anne, Henry had Parliament pass an act setting aside the authority of the Pope in England, and another making Henry himself the supreme head of the Church. At the same time, he caused the monasteries to be suppressed, greatly weakening the strength of the Catholic Church in the land.

But before long, Henry had Anne beheaded for alleged unfaithfulness. He immediately married Jane Seymour, who bore him a son, Edward, in 1537. When Jane died, Henry married Anne of Cleves. But he soon divorced her and married Catherine Howard, who, like Anne Boleyn, was executed for infidelity. In 1543 he married his sixth and last wife, Catherine Parr, who secretly favored the Reformation.

During Henry's troublesome reign, France and Scotland renewed their old alliance, and England was again drawn into a war. Henry was aided in the early part of this struggle by Charles V of Germany, who soon withdrew, although the war continued till 1546.

See Boleyn, Anne; Catherine of Aragon; Wolsey, Thomas; England, Church of.

HENRY III (1551-1589). One of the most troublesome reigns in the history of France was that of Henry III. Ascending the throne upon the death of his brother, Charles IX, in 1574, he continued the war against the

TWO MEN—TWO EPOCHS
Henry III of France was perhaps the weakest king the nation ever had. Top, Henry III and nobles. Henry IV (right), first of the Bourbons, did much to improve his country.

Huguenots. At last he was forced to grant the Huguenots certain rights, which led to the formation of a Catholic League. This league forced Henry to repeal the rights granted the Huguenots, and another war began in which the Protestants, under Henry of Navarre, triumphed. It was to their camp that Henry III fled after causing the murders of the Catholic leaders, the Duke of Guise and the Cardinal of Lorraine. Henry was himself murdered in 1589 and was succeeded by Henry of Navarre as Henry IV. See HUGUENOTS.

HENRY IV (1553-1610). A great French character and king was Henry IV, better known as Henry of Navarre. Son of Anthony of Bourbon, Duke of Vendôme, and of Jeanne d'Albret, queen of Navarre, he was educated in the Calvinistic faith by his mother, joined the Protestant army, and served under Admiral Coligny. Upon his mother's death, in 1572, he became king of Navarre. Shortly afterward he married Margaret of Valois, whose treacherous mother was jealous of Coligny's influence over Henry and brought about the Massacre of Saint Bartholomew. Coligny was killed, and Henry escaped with his life only by accepting Catholicism.

During the next four years he was held virtually a prisoner, but finally escaped, gathered an army of Huguenots, and continued the religious wars. After the death of King Henry III, Henry IV was obliged to fight to gain his throne. He besieged Paris and finally gained the crown by be-

THREE GENERATIONS OF HENRYS
Germany's Henry III directed many wars. Above, he challenges the French king. Henry IV disputed with the Pope. His son Henry V carried on after his death (left).

coming a Catholic in 1593.

He was formally crowned the following year, only three provinces holding out against him; and these were in his hands by the spring of 1598. The same year brought the end of a war against Spain, an advantageous peace being concluded at Vervins. The year 1598 also brought the Edict of Nantes, granting the Protestants of France religious liberty. Henry then devoted his time to restoring the prosperity of the nation.

About this time, he divorced Margaret of Valois and in 1600 married Maria de' Medici, niece of the Grand Duke of Tuscany, mother of Louis XIII. Following her coronation ten years later, Henry was stabbed by a fanatic. See BARTHOLOMEW'S DAY, SAINT.

HENRY III (1017-1056). A man of power, Henry III became king of part of Germany in 1028. Upon the death of his father, in 1039, he became Holy Roman Emperor. Having added to his power by conquering Hungary, Bohemia, and Apulia, he invaded Rome in 1046, deposed the Pope, and selected a new one. During the last ten years of his life he was extremely powerful in Church matters.

HENRY IV (1050-1106). Holy Roman Emperor and king of Germany, Henry IV lacked many of the powerful qualities of his famous father, Henry III. Although he came to the throne in 1056, when his father died, Germany was under a regency for

"IF THIS BE TREASON, MAKE THE MOST OF IT!"
That was Patrick Henry's retort to cries of "treason" which interrupted his fiery speech in the Virginia House of Burgesses. Henry was one of America's first "rebels."

several years. When he finally assumed the rule, he discovered that most of the power had already been taken over by the Church and the nobility. In 1073 a Saxon rebellion began, which lasted off and on for fifteen years.

The year 1075 marked the start of a conflict with Pope Gregory VII, when Henry refused to abide by a Papal rule forbidding the appointment of ecclesiastical officers by civil authorities. As a result, Henry deposed the Pope and was forthwith excommunicated. Later, Henry was forced to submit, after the Pope had released all German subjects from their allegiance to him.

The year 1080 brought another excommunication, which so angered Henry that he invaded Rome and drove Gregory from the city, placing an anti-Pope on the throne. Later, Henry was driven out of Italy, and in the year 1105 he was forced by his nobles to abdicate.

HENRY VI (1165-1197). Son of the great Frederick Barbarossa (see FREDERICK I), Henry VI came to the throne of Germany in 1169. In 1190 he became Holy Roman Emperor. Because his wife laid claim to the throne of Sicily, he was engaged in wars in Italy throughout much of his reign. When Richard I of England was captured on his return from the Holy Land, he was turned over to Henry, who held him until a ransom was paid.

HENRY, PATRICK (1736-1799). The gates of fame swung wide for Patrick Henry when, in an immortal address in opposition to the hated Stamp Act, he cried, "Give me liberty or give me death!" With these historic words, Henry not only won the admiration of his fellow Americans but sounded the war cry of a freedom-seeking people.

A native of Virginia, Patrick Henry had little education. By the time he was twenty-four years old, he had already married and had failed in business and farming. Turning to the legal profession, he achieved more success. In 1763 he won renown for an eloquent speech against an unpopular decree of King George III. When he made his famed address, he won such praise that he was elected to the First Continental Congress. In 1776 he was the principal advocate of independence in the Virginia convention. That year, he was elected governor of the state and served four more terms.

Henry was not so profound a thinker as many of the other Revolutionary leaders, and his words were directed more to the emotions of his listeners than to their reason.

HENRY THE NAVIGATOR (1394-1460). Portugal's glory on the seas was made possible by Henry the Navigator, princely patron of fifteenth-century mariners. Third surviving son of King John the Great of Portugal, Henry early grew to love the sea and sought to enhance the power of his country by exploration and discovery. His fondest hope was to find a sea route to India by sailing around Africa.

But Henry also believed that mariners should be trained for such dangerous voyages. So he founded a school of navigation, brought the finest astronomers and mathematicians to Sagres (where his observatory was located), and soon established Portugal as the leader in Atlantic navigation. His sailors voyaged south and west, gradually gaining a knowledge of the western coast line of Africa. The Azores, the Canaries, and the Madeira Islands all were discovered and mapped by his daring mariners. Cape Blanco and Cape Verde made their appearances on the maps of the time. Such discoveries did more than bring fame. They also brought riches to Portugal, for a lively trade sprang up. Unfortunately, one of the results of this trade was the beginning of the Negro slave traffic.

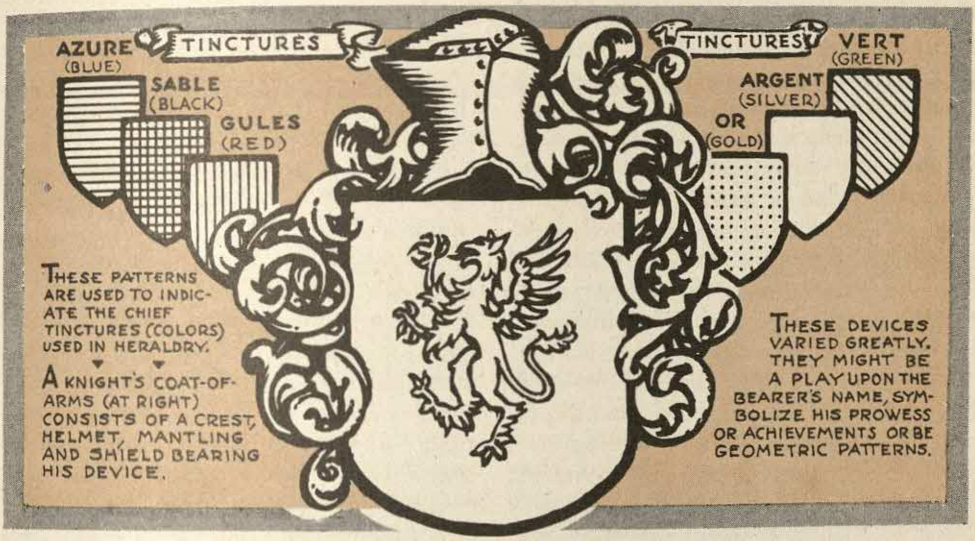
Henry's great ambition—to find a route to India by sailing around Africa—was not realized during his lifetime. But his teachings and hopes were carried on; and finally, as the fifteenth century was ending, Vasco da Gama traveled the route foreseen by Henry.

HEPAT'ICA. Called the earliest harbinger of spring, this beautifully tinted flower may appear in the late winter simultaneously with the melting of the last snows. The hepaticas are noted for the exquisite, delicate coloration of the flowers. The tints vary from pale blue to purple, pink, and pure white. The fuzzy little buds and the tender flowers are exceedingly welcome after the monotony of the winter landscape.

HER'ALDRY. Animals, birds, plants, astronomical and geometrical designs, painted in brilliant red, gold, silver, blue, black, and green, decorated the shields of the knights of the Middle Ages. For that was the age of heraldry, when warriors encased in steel could not tell one another apart without some distinctive design emblazoned on the shield. Heraldry still persists, even though armored knights no longer journey far afield to make war against the Saracens. It is a fascinating and intriguing study of the hallmarks of ancient families and institutions which still carry their *armorial bearings*, or coats of arms. Practically everyone in the Middle Ages who was not a serf or an outcast had his coat of arms.

All sorts of *devices* were used. Lions and leopards were common. Flowers and other plants, and crescents, stars, and crosses were profuse. They might be a play upon the bearer's name, symbolize his prowess or achievements or the place he hailed from, or be mere geometric patterns. Many knights adopted the same patterns, causing confusion in battle; and *heralds* were appointed to award separate insignia to the various knights. Thus we have the name *heraldry*. The Herald's College in England still is maintained for the purpose of assigning new coats of arms and regulating the use of old ones.

HERBART, *hehr'bahrt*, JOHANN FRIEDRICH (1776-1841). The German scholar, Johann Friedrich Herbart, believed a person is more important than the things he learns, and that the object of education is to make him more worth-while. He emphasized that children would learn faster if the material were made interesting, and taught that the relationship between all


AZURE (BLUE)
TINCTURES
SABLE (BLACK)
GULES (RED)
TINCTURES
VERT (GREEN)
ARGENT (SILVER)
OR (GOLD)
THESE PATTERNS ARE USED TO INDICATE THE CHIEF TINCTURES (COLORS) USED IN HERALDRY.
A KNIGHT'S COAT-OF-ARMS (AT RIGHT) CONSISTS OF A CREST, HELMET, MANTLING AND SHIELD BEARING HIS DEVICE.
THESE DEVICES VARIED GREATLY. THEY MIGHT BE A PLAY UPON THE BEARER'S NAME, SYMBOLIZE HIS PROWESS OR ACHIEVEMENTS OR BE GEOMETRIC PATTERNS.

PROUD EMBLEMS OF NOBLE LINEAGE

There are great numbers of heraldic devices, each representing a special nation, family, or individual. They are designed according to the rigid rules of ancient heraldry.

subjects should be remembered in teaching. Herbart also developed the doctrine of apperception, namely, that what is new to the mind should be interpreted and explained in terms of previous experience and knowledge. Because of these theories, he is called the founder and leader of the "New Education."

At Königsberg, Herbart founded a seminary for teachers where his theories were taught. The school was closed by government order in 1833; but his ideas were spread, through the students, to all lands and grew into the modern educational systems.

The noted educator was born at Oldenburg, educated at the University of Jena, and for a while was a follower of the philosopher Fichte. Many of his outstanding writings have been translated into English.

HER'BERT, Victor (1859-1924). The world-wide popularity of Victor Herbert's charming light operas is well deserved. His gay, melodious tunes are in the hearts of everyone, and the songs from his operettas are probably broadcast by radio more often than those of any other composer.

Herbert was born in Dublin, Ireland, and began his musical career at the age of seven, studying at Stuttgart University in Germany. There he became a concert performer on the violoncello, and soon obtained the position of first 'cellist in the court orchestra at Stuttgart. From there he went to the Metropolitan Orchestra of New York.

After a period with the Theodore Thomas Orchestra in Chicago, Herbert in 1893 became director of the Twenty-second Regiment Band. Five years later the artist became conductor of the Pittsburgh Symphony Orchestra, where he continued until 1904. Following that engagement, he devoted most of his time to composing.

Herbert's work includes music for some of the Ziegfeld *Follies* and the accompaniment to the motion picture *The Birth of a Nation.* Among his best-known light operas are *The Fortune Teller, Babes in Toyland, Mlle. Modiste, The Red Mill, Sweethearts, Princess Pat,* and *Naughty Marietta.* The grand opera *Natoma* and two symphonies are among his more serious works.

HERBIV'OROUS ANIMALS. All grazing animals, both domestic and wild, were formerly classified in zoölogy as *herbivorous,* a term that means *feeding only on herbage.* This group includes all animals which are not *carnivorous* (meat-eating). The term is no longer in common usage. See Zoölogy.

HERBS, *urbz,* or *hurbz.* Very few of us think of a bean plant as an herb, or of goldenrod, or even of rhubarb. The word brings to mind, instead, mint and pennyroyal and sage, tansy and saffron and summer savory. But these latter are only sweet herbs, and any plant which dies to earth each year, whether it be an annual, a biennial, or a perennial, is *herbaceous.*

Sweet herbs have grown in our kitchen gardens and about our houses for so many centuries that their stories are intimately connected with the lives of the people. Nowadays they are chiefly grown to flavor our foods. Formerly, many of them were valued as home medicines, and various brews of sage and tansy and pennyroyal and catnip, known as *teas,* are still familiar to some of us. In earlier times herbs were connected with beliefs in witchcraft and sorcery, some as helps in casting spells, others as protections against the evil eye.

The following sweet herbs are described in this work:

Caraway
Catnip
Hop
Horehound
Lavender
Mint
Parsley
Rosemary
Sage
Sorrel
Tansy
Wintergreen
Wormwood

HERCULA'NEUM. Gradually, as men pierce through the cold ashes at the base of Mount Vesuvius, the ancient civilization of Herculaneum is being brought to light. For centuries after an eruption of the volcano buried that city and Pompeii, in 79 A. D., no one knew where Herculaneum had stood. Statues, however, were found by men digging wells, early in the eighteenth century, and since then, excellent examples of statuary, pottery, and other art objects have been unearthed. Herculaneum was situated about five miles southeast of Naples. See Vesuvius.

HERCULES, *hur'ku leez.* Fables of ancient Greece tell of no greater hero than Hercules, whose strength was so prodigious that he could perform almost any task, no matter how difficult.

Hercules was half man and half god, for he was the son of Zeus and a mortal princess, Alcmene. When he was a child, he strangled two fierce serpents sent by Hera, the jealous wife of Zeus. This defeat angered Hera; and when Hercules grew up and married, she made him insane, causing him to kill his wife and three children. To be purified of this terrible crime, Hercules was assigned to his cousin Eurystheus, who gave him the famous Twelve Labors to perform.

First, he had to kill the Nemean lion, then destroy the terrible Hydra, and after that, capture a fleet stag that had gold horns and bronze feet. His fourth labor was to capture a wild boar, then clean the filthy Augean stables, and, upon fulfilling that, kill the cannibal birds at Lake Stymphalus. When he had accomplished all these labors, he was compelled to capture the destructive wild bull of Crete, bring back the horses of Diomedes, and obtain the girdle worn by the queen of the Amazons. His last three labors were to kill a fierce monster named Geryon and seize his flocks; procure the three golden apples from the garden of Hesperides; and, finally, go to Hades and bring back Cerberus, Pluto's dog.

Hercules in time married Deianara, who one day sent him a robe which had been dipped in the blood of a dying centaur. When he donned the robe Hercules felt such terrible pain that he was driven nearly mad. But he could not tear off the robe and finally committed suicide. Zeus carried the immortal remains of the hero to Mount Olympus, and there Hercules became the husband of Hebe.

HERED'ITY. One of the most wonderful manifestations of nature is the tendency of an organism to develop in the likeness of a parent. This tendency is of the highest importance to the well-being

STRONG MAN

Hercules was the legendary Grecian giant.

of man. The resemblance of son to father and, in general, of children to their parents is a matter of common observation. The child may have the hair color of the mother and the eye color of the father and thus show traits of both parents.

All organisms develop from a single cell that by its growth and multiplication forms the new organism, be it a child, a plant, or an animal. This cell is formed by the union of two germ cells, one coming from the mother (the egg cell) and the other coming from the father (the sperm, or pollen, cell). These germ cells carry the hereditary factors for all of the characters of the parental types, and only those characters that the parents possess. Thus the egg cell of man produces a man, and that of corn produces corn. However, the mother and father differ from each other in certain individual characters, and thus the offspring may exhibit certain characters of either parent. See BREEDING.

HER'ETIC. One who calls himself a Christian, but does not accept the doctrines of the Church of which he is a member, is a heretic. The name came into prominence during the various Catholic inquisitions of the Middle Ages, when disbelievers were severely punished. Among the sects which have at various times been branded by the Roman Catholic Church as heretics are the Waldenses, the Hussites, the Wycliffites, and the Lutherans.

In the early days of the Christian Era, many professed believers clung to their Jewish and Greek traditions. Before the conversion of the Roman emperors, however, nothing more than excommunication was inflicted on these people. Justinian's Code specifically condemns heresy and provides punishment for it. The opposition of the Church to free thinking reached its height during the Middle Ages, and now has dwindled until the doctrine of religious toleration has virtually replaced the ostracism of the heretic.

HERMES, *hur'meez.* See MERCURY.

HER'MIT CRAB. Nature's marine robber is the hermit crab, a small, shrimplike crab which makes its home in the cast-off shells of other animals. Sometimes, if no empty shell is handy, the hermit hauls another creature out of its home, eats it, and moves into the shell. It does this because it has no natural shell over its abdomen. Hermit crabs have a hooklike claw with which they fasten themselves to their stolen homes. When they grow larger, they move to roomier quarters, but it is impossible to get them out of the shells without tearing them.

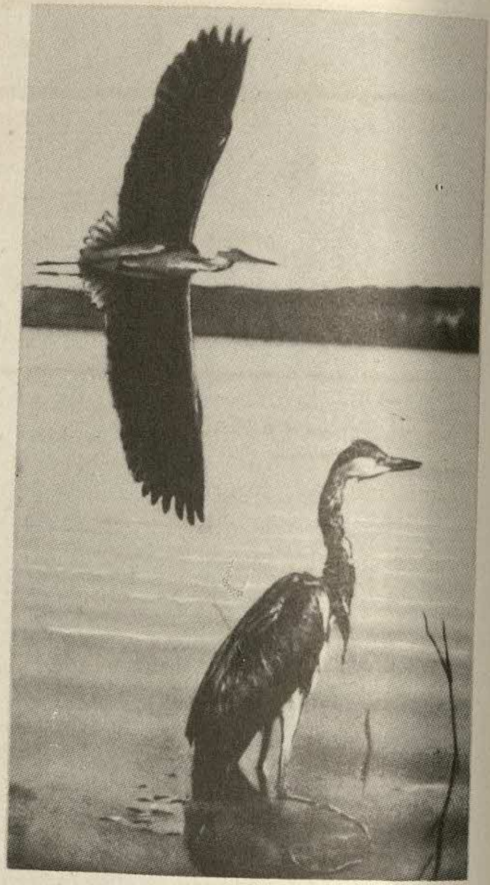
HERO. Greek mythology tells us that Hero was a priestess of Aphrodite, the goddess of love. She supposedly lived on the coast of Thrace in a secluded tower. Leander, a young man of Abydos, was much in love with Hero and swam across the Hellespont every night to visit her, guided by a torch in her tower. One night, however, he was drowned, and the sorrowing Hero leaped from the tower and died beside her lover.

HER'OD, called The Great (died 4 B. C.). The king of the Jews at the time of the birth of Jesus, according to the Bible, was Herod the Great. His decision to prevent the rise of a Messiah by murdering all babies forced the Holy Family to escape to Egypt. Roman history tells us that Herod was declared king of Judea by the Roman Senate in 40 B. C., and that Augustus retained him after the Battle of Actium, 31 B. C.

During his reign, Herold built a huge theater and ampitheater in Jerusalem, and rebuilt the Temple on a grand scale. His policies of grandeur gained for the Jews considerable glory, but his high-handed methods finally undermined Jewish governmental principles, for he dissolved the National Council and began appointing and removing priests at will, contrary to rights of succession.

HEROD'OTUS (about 484- about 425 B. C.). How little man would know about the ancient world if the writings of Herodotus had been lost! For this great Greek was truly the "father of history," and his works have given us invaluable information, not only about his land and people, but also about the Egyptians, Babylonians, Persians, and other Mediterranean people who laid the foundations of civilization.

Herodotus did not write his histories entirely from tales and hearsay. He traveled and saw for himself. A native of Halicarnassus, Asia Minor, he wandered up and down the Mediterranean, the Nile, and the Tigris-Euphrates Valley, observing the way people lived and thought and worked. He began his *History,* but was interrupted by a campaign against a tyrant, Lygdamis, who had usurped the power in his city. Successful in overthrowing the tyrant, Herodotus again left his city when an oligarchy even more harsh obtained control. He lived in Athens for awhile, and then helped to found Thurii in Italy, where he completed his *History.*

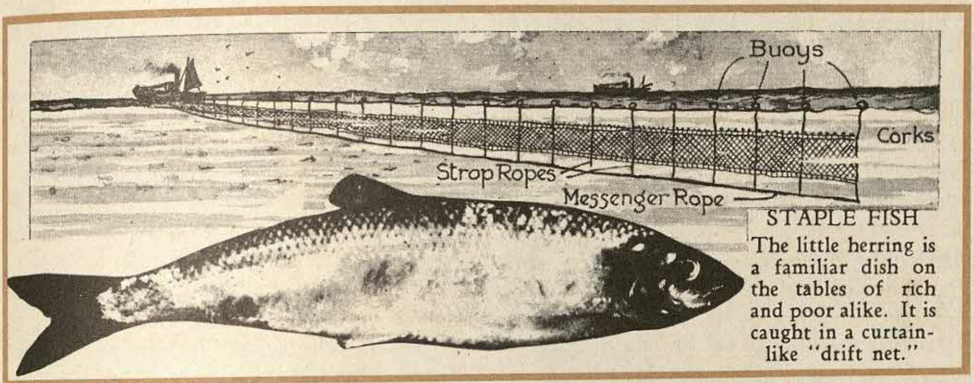


SWAMP DIGNITARY

Herons, graceful fliers of the marshes, are expert fishers in shallow water.

HERON, *hehr'on.* Long legs, slender necks, small heads, and long, sharp bills distinguish the herons, a family of wading birds which also includes the bitterns and egrets. When herons fly, their legs are stretched straight out behind, but their necks are doubled back. This characteristic distinguishes them from their uncommon relatives, the cranes.

One of the best-known North American species is the *great blue* heron, so often seen standing motionless in the edge of a pond or stream watching for fish or frogs, which it catches with lightning-like thrusts of its long bill. It is a bird about four feet high, with a wingspread of six feet or more. The general color is grayish blue, lighter below. The crown is black, and the feathers are lengthened into



STAPLE FISH

The little herring is a familiar dish on the tables of rich and poor alike. It is caught in a curtain-like "drift net."

a crest. This heron is found in summer throughout the United States and Canada, wintering from Oregon and the Middle Atlantic states southward.

An even more common species is the smaller *green* heron, "shitepoke" or "fly-up-the-creek," as it is called by country folk. It is about the size of a crow, and solitary in nesting habits.

A third species, more often heard than seen, is the *black-crowned night* heron, or "quawk." It lives in colonies and begins its search for food after sunset. Farther south occurs the *yellow-crowned night* heron. Other North American herons are the *great white* heron, the *little blue* heron, and the *Louisiana* heron. See EGRET; BITTERN.

HER'RING. The most important fish in the world, so far as commerce is concerned, is the herring. In appearance herring are blue-green above and silvery white below, and they grow to a length of about one foot. During most of the year they remain in deep water, but with the approach of summer they seek shallower water near shore and there lay their millions of eggs. They travel in huge schools, covering an area of from six to twenty miles, and are easily caught with nets.

Herring are found in the North Atlantic and the North Sea. The most important American fishing ground is along the New England coast and as far as Newfoundland. There is also a Pacific species found along the coasts of North America, Japan, and China. Besides the common herring, this family of fish includes the shad, menhaden, alewife, and sardine.

Either fresh or in a number of prepared ways, herring are important food fish. Kippered herring are cleaned, smoked, and salted somewhat. Bloaters are partly cured but are not salted. Red herring are smoked and heavily salted.

HESPERIDES, *hes pehr'e deez.* Hera, a Greek goddess and wife of Zeus, had some precious golden apples, which she gave to three nymphs, called the Hesperides, to keep safe for her. Ladon, a fierce dragon that never went to sleep, was also given the task of guarding the golden apples. These apples were supposed to be growing on a small island in the Mediterranean Sea. As one of his Twelve Labors, Hercules, the strongest man in the world, slew the dragon and brought the golden apples to Eurystheus. See HERCULES.

HESSIAN, *hesh'an,* **FLY.** Among farm pests, the two-winged Hessian fly does much damage to such grain crops as barley, wheat, and rye. The eggs of the fly are laid in May and September, on young grain plants, and hatch in from three to seven days. The larvae, or maggots, enter the grain between the outer leaf and the stem, attaching themselves to the lower joints, where they suck the juice out of the stem.

To prevent their attacking winter wheat, it is customary to plant the crop after the egg-laying season. In the case of spring wheat, a narrow strip of the grain is sometimes planted early enough for the insects to deposit their eggs, after which it is plowed under. If this is not done, late planting is relied upon. All stubble should be plowed immediately after harvest.

With a brown body, shading to black on the thorax and head, the female fly is about an eighth of an inch long, and has a wingspread of a quarter of an inch. The wings are a dusky gray, surrounded by fringes. The male of the species is somewhat smaller, but has longer antennae.

HESSIANS, *hesh'anz.* In the American Revolutionary War, the German mercenary soldiers who served with the British were mostly from the Duchy of Hesse in the west-central part of Germany and were collectively called Hessians. They received little pay, the bulk of the money paid for their services going to the German rulers who enlisted them. One troop of Hessians was surprised and captured by General Washington in his victory at Trenton. See REVOLUTIONARY WAR IN AMERICA.

HIAWATHA, *hi a wah'tha.* Henry Wadsworth Longfellow's beautiful poem *Hiawatha* is a story of an American Indian who could talk with the birds and beasts of the forests and who brought the message of peace to the tribes of North America. Although Hiawatha is supposed to be a legendary character, there was a chief of the Iroquois of that name (see FIVE NATIONS, THE).

HIBERNATION, *hi bur na'shun.* Certain animals pass the cold months in a state of dormancy or stupor called hibernation, from the Latin word meaning *to winter.* Notable examples of hibernating animals are found among those that live in burrows, such as woodchucks, prairie dogs, skunks, badgers, and their kin, but bears, squirrels, bats, some mice, and other animals also have a dormant period. Just before hibernation the animal usually grows very fat and well conditioned. During hibernation the vital processes sink to a low plane. The heart beat is slow, respiration is greatly diminished, the digestive organs become practically inactive, the body temperature falls to about that of the air, and there is a gradual losing of weight to the extent of thirty or forty per cent.

In warmer climates, animals pass into a similar state at the beginning of the dry season, when food is difficult to obtain. Mammals usually crawl into hollow trees, logs, or caves, or burrow into the ground to pass the winter, while hibernating reptiles and amphibians bury themselves below the frost line in marshy ground. Insects may winter successfully as adults, pupae, or eggs. There is often a difference in the habits of hibernating males and females. For instance, while the female bears, including the brown, black, and polar, fall into a complete lethargy, the males sleep only part of the time, awakening often to go about in search of food. Hunger is usually the call that arouses the animal finally, and body activity is quickly restored in most cases.

HIBERN'IANS, ANCIENT ORDER OF. All members of this organization are Irishmen and Roman Catholics. The purpose of the order is to further in every way possible the welfare of the Irish people. Members of the Hibernians are entitled to sick benefits, as the order is now a benevolent organization. It had its origin in the seventeenth century, probably during the Catholic persecutions under Cromwell. The purpose of its founder, Rory O'Moore, was to protect Irish Catholics during those troubled times. The present name and character of the order date from 1829. It has chapters in the United States, Canada, Mexico, and Hawaii. Hibernia is the ancient name of Ireland.

HIBISCUS, *hi bis'kus.* Very showy, with great, glossy leaves, hibiscus plants grow best in tropical and subtropical regions. They are a genus belonging to the mallow family. Representative of this group are the *swamp rose* mallow, the *marvel* mallow, and the *Chinese* mallow.

The swamp rose and marvel mallows

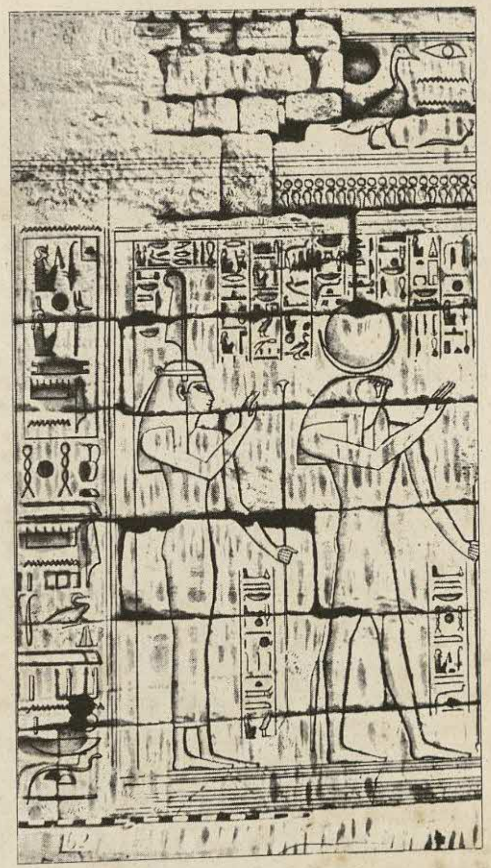
are hardy perennials. They have extraordinarily large flowers about ten inches across, ranging in color from white, through pink to intense crimson. It is late spring before the plants start growing, because they die down to the ground each winter and are about the latest plants to show signs of life.

The Chinese mallow is not hardy, but the plants are frequently grown in tubs which can be placed out of doors in summer and taken into the cellar during the winter. The flowers are usually five to six inches in diameter and range from white to orange, scarlet, and rose.

HICK'ORY. More than fifteen species of this hardwood tree grow wild in North America. Their native range is the eastern half of the forested area. They are, of course, planted elsewhere for various purposes. They are possibly best known through their fruits, which are valuable food for man. While we of the present day do not necessarily consider nuts as a staple part of our diets, the Indians of Eastern North America used to find hickory nuts a most valuable oily food. Not all of the hickories, however, have nuts that are good to eat, as we may find by experience.

The best-known hickories are probably the *pecan,* the *shagbark,* the *bitternut, pignut,* and *mockernut.* The bark of the shagbark peels off in long, vertical strips when the tree is old; it produces the hickory nut of commerce, and the tough wood is used for tool handles, baskets, hoops, and fuel. As the name implies, the fruit of the bitternut is extremely bitter. The fruit of the mockernut has a thick husk and a kernel that is sweet but small. Pignuts also bear bitter fruit. See PECAN.

HIEROGLYPHICS, *hi er o glif'iks.* When Pharaohs lived in lavish, colonnaded palaces and the pyramids gleamed bright and new above the sands of Egypt, men wrote in the form of pictures. This method of telling stories, through pictures called hieroglyphics, was very complicated, and only the most learned of scholars were able to read and relate the histories and tales depicted on papyrus and walls. But it was man's first method of writing, and our modern alphabet can trace its ancestry to the strange, curious drawings of the ancient Egyptians.



"HANDWRITING"—4,000 B. C.
Hieroglyphics were man's first form of writing. The characters were stylized pictures of things, rather than symbols like letters.

The name hieroglyphics, from the Greek words for *sacred* and *carve,* was given the Egyptian form of writing by the Greeks, who believed that hieroglyphic writings were sacred and could be read only by the priests. This belief was almost true, for by the time of the Greeks few people other than priests could understand the pictures, and, eventually, no one could. But in 1799 the famed Rosetta Stone was discovered, and it provided the key to translating the strange characters (see Rosetta Stone).

From this discovery, scientists found that the Egyptians did not write in hieroglyphics alone. This method was the earliest form and consisted of many symbols representing animals, people, buildings, implements used at the time, and the elements. *Hieratic* writing followed the hieroglyphic. Used mostly by the priests, the symbols of the hieratic were less like figures of objects than the hieroglyphics. A third form was the *demotic,* included among the inscriptions on the Rosetta Stone. It was used commonly except for religious writing.

Men who study hieroglyphics have worked out the formula that usually the symbols for sounds and syllables are the basis of the writings, while the symbols for ideas are inserted to make the meaning more clear, to provide decoration, or even to make the language more mysterious.

Hieroglyphics were used by the Mayas in Central America and Mexico long years ago. But their writing was not so advanced as the Egyptian, and the rude pictures conveyed mostly ideas.

HIGH PRIEST. Clad in a gorgeous blue robe, decorated with a delicately embroidered *ephod,* or vestment, and set off with a glittering, jeweled breastplate, the high priest was the spiritual ruler of the ancient Jews. He had charge of the sanctuary and preserved the *Torah,* or *Book of Laws;* and on *Yom Kippur,* or the Day of Atonement, it was he who entered the so-called Holy of Holies.

First of the high priests was Aaron, brother of Moses, and for hundreds of years the position was handed down to his descendants. In time the high priests became corrupt and autocratic, and during the rule of the Romans, they wielded so much power that the imperial governors were forced to remove them whenever they feared an uprising.

HIGH SCHOOL. In the educational system, the high school includes those grades between the common or grammar school and the college or university. The purpose of the high school is two-fold—to prepare those students who expect to attend colleges and to train other students for later life by means of vocational instruction in domestic science, manual training, and similar subjects.

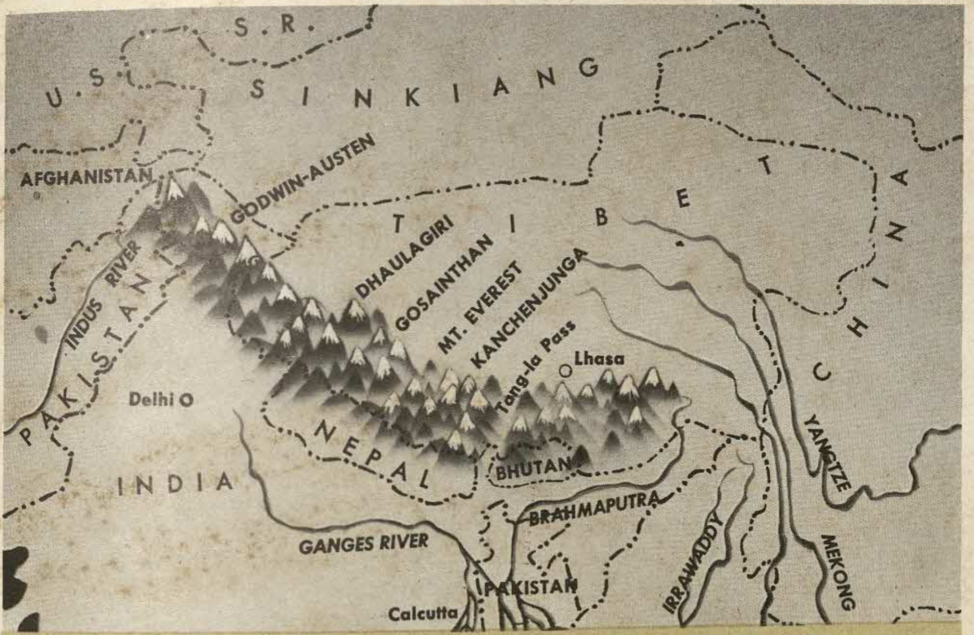
In cities, high schools are a part of the city school system and are supported in the same manner as are the other schools. In some states, if the high school meets certain requirements, it is affiliated with the state university and receives financial aid from the state.

Rural High Schools. Towns and villages of less than 1,500 inhabitants usually unite with others in the vicinity and organize a *community* high school. In some states the township is the unit of organization; in others, regular school districts are laid out.

Junior High Schools. In order to make the transition between common school and high school easier, many larger communities have established the *junior* high school, which includes the seventh and eighth grades of the common school and the first year of high school; it is generally known as the *6-3-3 plan.* In some places, however, only the seventh and eighth grades are included in such a school. The junior high school has the approval of many educators, and the movement is growing.

HIGH SEAS. There is an international understanding that a country bordering a sea has control of the waters for a distance of only three miles out from its coast. From that point, the waters are known as the "high seas" and all nations are on equal terms, individuals being free from the authority of any country unless they are traveling under the protection of a particular national flag. The rule does not apply to inland seas generally, although the United States Supreme Court has called the Great Lakes "high seas." Some nations reserve the right to search vessels within twelve miles of their shores.

HIGH'WAY. See Roads and Streets.



NATURE'S OWN SKYSCRAPERS—THE MIGHTY HIMALAYA
A giant barrier to travel and trade between India and Pakistan to the south and Tibet and China to the north, the Himalaya are crossed only by lofty passes.

HIMALAYA, *hih mah' luh yuh*. Stretching for 1,500 miles along the northern border of India are the towering peaks of the Himalaya mountain system of South Asia. Included in it is Mount Everest, the highest mountain peak in the world, reaching an estimated height of 29,028 feet. Except for low passes at the eastern and western ends, marked by the Brahmaputra and the Indus rivers, the Himalaya are a barrier not only to man but also to the frigid climate of the high plateau of Tibet, which is called the "Roof of the World."

Included in the main range of the Himalaya are such imposing peaks as Kanchenjunga, 28,146 feet above sea level; Nanga Parbat, 26,620 feet; Dhaulagiri, 26,620 feet; and Kamet, 25,447 feet. Mount Godwin-Austen is 28,250 feet high, but, strictly speaking, it belongs to the Karakorums rather than the Himalaya.

The Himalaya can be divided into two parts, the western and the eastern. The eastern portion is very wet, with an average rainfall of about 120 inches. Here the range rises steeply from the plains and is so rugged that there are only a few scattered Mongol villages. The mountain slopes are covered with dense forests up to the snow line, but they are so inaccessible that little timber can be taken from them. The western portion of the Himalaya is much drier than the eastern. Here the slopes are not so steep, and some farming is carried on by the Kashmir people. The forests, too, are more easily reached, and some logging is carried on.

Near the tops there are many large glaciers. Beginning on the foothills, and running up to 12,000 feet, are forests of chestnuts, oaks, and rhododendrons. For the next 2,000 feet there are forests of scrubby pines which give way to scattered shrubs. At about 14,000 feet vegetation stops, and the snow begins. There are many varieties of wild animals in the Himalaya, including the tiger, yak, mountain goat, and several kinds of deer, as well as many wild birds.

The Himalaya have always been a challenge to man, and many attempts have been made to scale their heights. Two members of a British expedition led by Sir John Hunt reached the top of Mt. Everest on May 29, 1953. They were Sir Edmund Hillary of New Zealand and Tenzing Norgay, a Nepalese Sherpa tribesman. In 1956, a Swiss expedition scaled Mt. Everest twice.

Underwood and Underwood

ASTUTE FIELD MARSHAL

Military leader of Germany in World War I, Hindenburg later headed the Weimar Republic.

HINDENBURG, Paul von Beneckendorff und von (1847-1934). One of the most remarkable military strategists of all time was Paul von Hindenburg, a leader of the German armies during World War I. As the highest possible tribute, he was elected in 1925 to the office of President of the republic. In this capacity he won the respect and confidence of other nations and retained the affection of his own people.

The career of Von Hindenburg began with the Seven Weeks' War against Austria in 1866. Later he fought in the Franco-German War. At the end of that war he studied military tactics. Later he became general of the infantry and a lecturer at the War Academy, where he frequently speculated on the importance of the marshy Masurian Lakes region as a potential battleground.

At the outbreak of World War I, Von Hindenburg was in retirement, having given up active service in 1911. But in 1914 Emperor William II recalled him, and he was given the opportunity of proving his theories when he defeated the powerful Russian armies in the Masurian area.

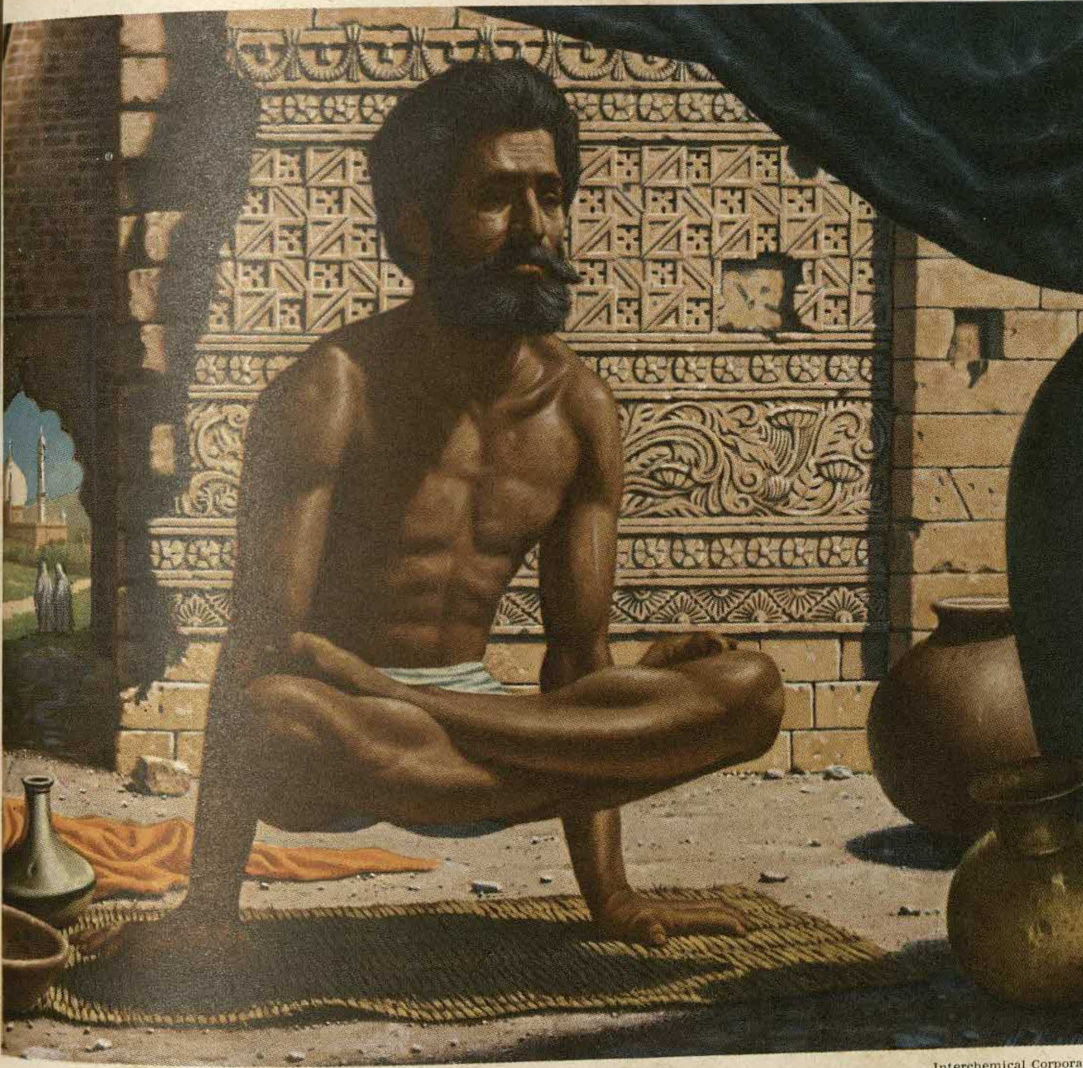
In 1916 Von Hindenburg became field marshal and chief of staff. It was he who laid the plans for the campaign on the Western front during the closing years of the war.

Honored and revered by the German people, he was elected President in 1925 and again in 1932. In 1933, however, he was forced to appoint Adolf Hitler as Chancellor of the Reich. See Germany; Hitler, Adolf; World War I.

HINDU, *hin'doo,* AND HINDUISM. More than three fourths of the people of India are Hindus, adherents of a faith 5,000 years old, whose chief distinction is the caste system. This religion, now controlled by the Brahmans, or priests, who form the highest caste, maintains rigid control over the faithful. Thus Hinduism is both a religious and a social order. It is unconnected with race or color.

The caste system is based on Brahmanism, which teaches that all things came from Brahma, the "universal creator" or "absolute." Associated with him are Vishnu, the preserver, and Siva, the destroyer and reproducer. The castes are grouped into four main classes (see Caste). The different castes represent the different parts of Brahma's body; the priests allegedly came from his head, the warriors from his arms, and so on, down the list of thousands of castes, to the feet, whence came the lowest, or sweeper, caste. Hindus regard all others as outcasts, or *Pariahs,* and untouchable.

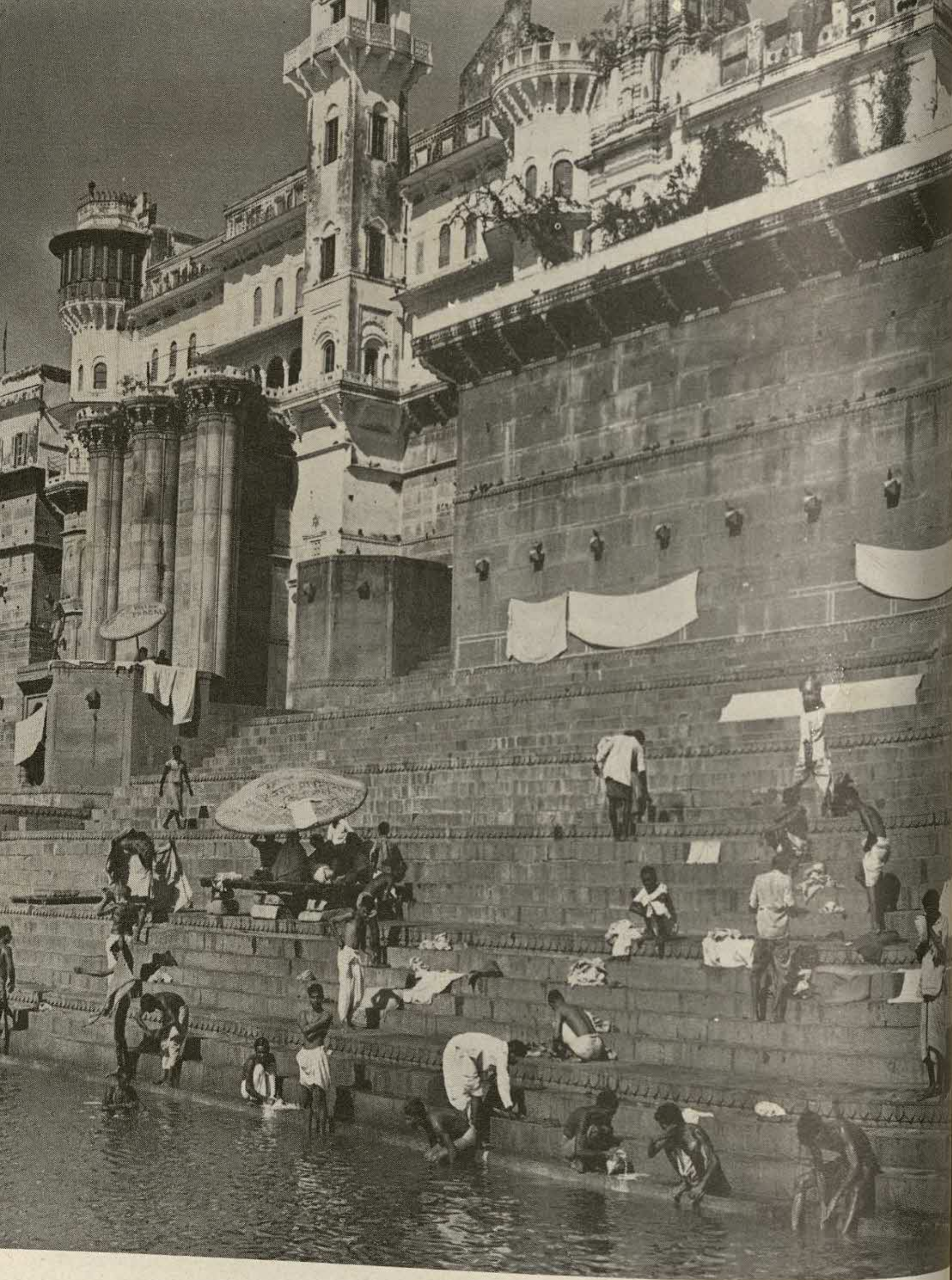
Hindus are born into their castes, and cannot improve or degrade their status. They believe in reincarnation; that is, that the souls of the dead enter some other body, possibly even that of an animal. So, since any animal may be the abode of some departed relative, all animals are regarded as more or less sacred, and may not be



Interchemical Corpora

IN INDIA, YOGIS PRACTICE PHYSICAL CONTROL

Hinduism, a native belief of India, is one of the oldest religions in the world. It is divided into dozens of sects. The one objective of Hindus is to achieve union with God through the ideals of purity, truth, nonviolence, and self-control. A self-discipline to achieve this control is called *yoga*, and those who practice it are *yogis*.



United Press

HINDU WORSHIPERS BATHE IN THE GANGES

The Ganges River, in northern India, is sacred to devout Hindus. Bathing ghats, or landings, with steps leading to the water, are built for the purifying ritual.

killed. Even the most dangerous creatures are included, from plague-spreading flies to tigers. It is only through migrations of the soul through other beings that caste may be changed, and only thus that Hindus may expect to reach communion with Brahma, the creator. Involved in Hinduism are a great many other gods below Brahma, most of whom are represented by idols.

The division of old India into the new nations of India and Pakistan resulted chiefly from the demands of Hindu and Moslem groups for separation. Modern India is a Hindu state, and Pakistan is a Moslem state. The caste system survives in modern India, but steps have been taken to improve the lowly condition of outcaste Hindus. In 1948 "untouchability" was officially outlawed in a move which followed the recommendation of the great Hindu leader, Gandhi. See BRAHMA; BRAHMANISM.

HINDUSTAN, *hin doo stahn'*. The great valley of the Ganges River, extending across northern India from West Pakistan to East Pakistan, is sometimes called Hindustan. The name means *home of the Hindus*. See INDIA.

HIPPOCAM'PUS, or SEA HORSE. Among the strangest of salt-water fishes is the hippocampus, or sea horse, as it is popularly called. Its true name is made up of Greek words meaning *monster sea horse*. Although the fish is only six inches long, it does bear a striking resemblance to the head of a horse. The body is covered with bony plates, and the fish has a snout and a spiny "mane." The tail is tightly coiled. Sea horses are poor swimmers, maintaining a vertical position and quite often hooking the end of the tail about a bit of seaweed for anchor. The eggs are carried in a little pouch on the male until they hatch.

HIPPOCAMPUS, OR SEA HORSE

HIPPOCRATES, *hip pok'ra teez* (about 460-377 B.C.). Young men entering the medical profession today honor Hippocrates, the father of their science, when they take the oath to pursue their profession faithfully and remain mindful of their duty to mankind. For, it was this ancient Greek priest-physician who set the high standards of medicine now followed by doctors of the modern age.

Born on the island of Cos, near Asia Minor, Hippocrates was thought to be immortal. Actually, he was only a man far in advance of his time, for he advocated such things as pure air, water, and sunshine to keep people healthy. He treated the sick in temples and originated many of the theories used by physicians today. Hippocrates followed his theories in his own life, and died at a very old age, the exact date of his death being unknown.

HIP'PODROME. An ancient public amusement center for horse and chariot racing was called a hippodrome by the Greeks. Among the most famous of the structures was the one at Constantinople during the Byzantine period. The Circus Maximus at Rome was a huge structure nearly half a mile long (See CIRCUS). Nowadays the term is sometimes applied to circuses or large amusement places.

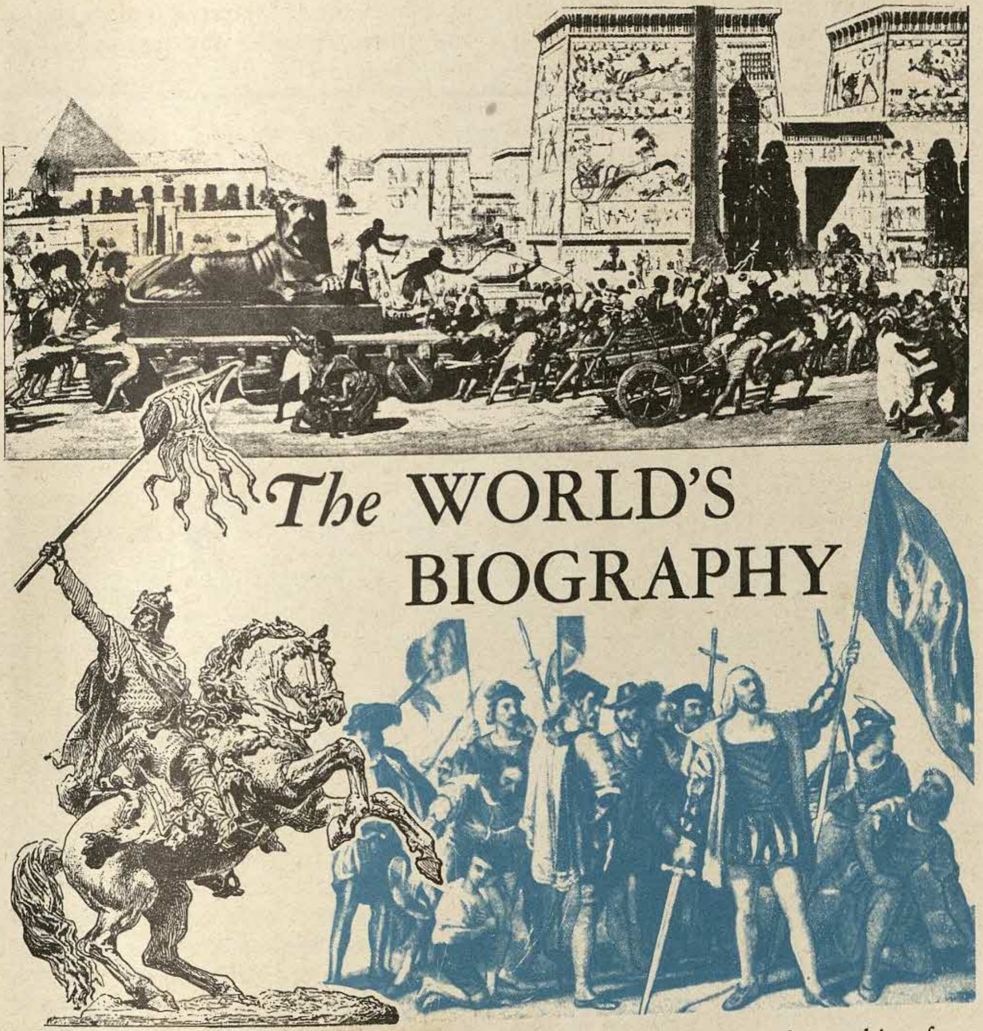
HIPPOPOTAMUS, *hip o pot'a mus*. In the wild, this animal is found only in Africa. Two species exist, the *common* hippopotamus and the *pigmy* hippopotamus. The common hippopotamus may weigh as much as four tons and may reach a length of eleven or more feet, though it is only about five feet tall. The pigmy hippopotamus is only a bit larger than a hog. One of these smaller forms weighs about 400 pounds. The most remarkable feature of these animals is the enormous mouth.

Common hippopotamuses live in large herds in the lakes and rivers of their home country. Their name, from the Greek, means *river horse*. They are more at home in the water than on land, and can stay beneath the surface for a long time. As their nostrils are on top of their noses, if they wish they may get a fresh breath of air without exposing any great portion of their bodies. The animals feed upon water plants.

These creatures are hunted for their hides, which make an excellent leather; for their fat; for their flesh, which is excellent food; and for the ivory of their teeth. They live comfortably in captivity. They are captured in pitfalls or are killed with rifles or harpoons. Their capture is dangerous sport, however, as a four-ton animal must be respected when it struggles or becomes enraged.

AFRICA'S MODERN "DINOSAUR"

The enormous, ugly hippopotamus, outsize "water horse," spends most of his time partially submerged in tropic pools and rivers, keeping cool. In spite of his tonnage, the creature is peaceable; rarely attacks anything.



The WORLD'S BIOGRAPHY

HISTORY. Every day is history. Everything that happens, whether in science, politics, art, or any of the thousand and one elements that make up the story of man, is history. Too often, one is inclined to think of history as a mere and, unfortunately, drab collection of dates, men, and battles. This is no more true than to think of man as a mere collection of bone and muscle. It is a living, vital, exciting story, a mystery tale whose beginning is as unknown as the beginning of life, and whose end will be reached only when life and the world cease existing.

History is change, the record of the never-ending evolution of everything, from the rock on the beach to the government of the United States, from the coal we mine from the earth to the latest invention. But it is man who has the most interesting history. He and his institutions have made us what we are today. Simply to narrate the story of man, his accomplishments, his governments, his art, and his culture, is not enough. History must take into consideration the forces that have affected man ever since he first appeared, the forces that exist today and will continue to exist. For the word *history* does not mean just description. It comes from a Greek word meaning *inquiry;* and, if we follow this interpretation of the word, we obtain an interesting, vivid knowledge of why there are dates and men and battles that are so important.

The Story of the Ancients. Recorded history begins on the banks of the Nile, the Tigris, and the Euphrates, and on the eastern shores of the Mediterranean.

Here we find four dominant forces: geography, religion, the people themselves, and slavery. On the banks of the Nile we can see these forces at work. The people living there are called Egyptians, and their land is Egypt. The land is flat and dry; it is almost all desert except for a narrow strip along the river. It rains seldom there. But each spring the Nile overflows and deposits a layer of silt along the banks. This silt is rich and fertile, and in it grains grow strong and hardy. Thus the people are able to cultivate the land easily, they do not have to struggle for a living, and they can turn their thoughts to such matters as writing and making things.

The Egyptians do not know why the river overflows every year or why the sun shines or why people are alive one day and die the next. They believe that there are gods who control all these things, and they adopt a religion. To worship their gods, they build temples and adopt a ritual. They believe that the dead have something to do with all these things; so they build monuments to the dead and great tombs for them. Huge pyramids, standing on the sands of Egypt, are built to house dead Pharaohs, the rulers of Egypt, and these pyramids are still standing.

The people themselves are highly intelligent, and they devise a system of government that lasts hundreds of years. But another force, slavery, also enters into the history of the Egyptians, and it is also responsible for the great contributions which founded civilization. Because there are slaves, men find time to invent a system of writing called hieroglyphics, to weave cloth, and to make war.

On the banks of the Euphrates and Tigris rivers similar forces are at work, and we find a civilization as old as that of Egypt and perhaps older. The Chaldeans, the Assyrians, and then the Chaldeans again, under the name of Babylonians, each take turns in ruling this land. Connecting the Nile and Tigris-Euphrates civilizations, the Jews, influenced more by religion than anything else, go from one to the other, introducing a belief in one God and absorbing the culture of both peoples. At this time also a people living on the eastern coast of the Mediterranean look out on the sea and wonder what lies beyond the horizon. They are the Phoenicians, and they sail to islands and lands far from their own shores.

Then come the great Persian conquerors, Cyrus the Great, Darius I, Xerxes, and Artaxerxes, seeking richer fields and wealth and finally founding a large empire. But by this time, in the sixth and seventh centuries before Christ, a new people, the Greeks, are becoming great on the other side of the Mediterranean. Geography has made them cluster in cities, each separate from the other, for hills make communication difficult. These city states provoke a feeling of pride among their people—a pride that, in the case of Athens, leads to literature and art; and in the case of Sparta, to an ambition for military power. The sea at their doorstep leads them to found colonies. Their religion pervades their life, and they erect splendid temples and compete in sports for their gods. Intelligent people, they are quick to adopt and improve the alphabet and the customs of other peoples; and the practice of slavery allows them to spend time writing, thinking, and discovering.

In 490 B. C., they turn back the invading Persians and enter an era of unsurpassed art and culture. But geography, which has separated the city states, is a force which cannot be denied; and the city states war against one another. They become weak from fighting and fall to the Macedonians of the north in the fourth century B. C., but Alexander the Great and his soldiers carry with them the civilization of the Greeks. Alexander's death results in a splitting up

THE MARRIAGE OF THE ANCIENT WORLD'S CHIEF HISTORY MAKER

Alexander the Great, who conquered the civilized world before he was thirty, married the beautiful Statira amid much festivity. The ceremony was held in Babylon.

of his empire; and in the second century B. C., the Greeks come under the domination of a people living on the Mediterranean to the west—the Romans.

Greek influence, however, continues to be felt, although the Romans introduce new ideas. The Romans, too, are affected by the forces of geography, religion, and slavery, especially the latter. As they wage wars of conquest to gain colonies, slavery undermines their social life; and more and more colonies are needed to feed the ever-growing poorer class. They conquer the entire Mediterranean coast and much of Central and Western Europe, and even go as far as Britain.

Julius Caesar rises in the first century B. C. to gain control of this empire that is seeking so much land but which has so many poor people at home. He is assassinated, and Rome comes under the rule of the emperors. A new religion begins to exert its force, for in Palestine, a Roman colony, a man called Jesus Christ brings a new faith into the world, a faith the Romans cannot understand and cannot stamp out. As the years go on, slavery, religion (Christianity), and barbarian invasions weaken the power of the Roman government; and finally the great empire falls. Thus ends the story of the ancients, and thus begins the story of the Middle Ages.

The Middle Ages. In Europe, which so long had been under the sway of the Romans, we find chaos after the fifth century. Roman legions no longer protect the people they once ruled, and the people are helpless. There are forces at work that bring a new kind of life to the people. One is the

CONQUEROR OF THE INVINCIBLE
Of the northern barbarians who finally conquered mighty Rome, Hermann was outstanding.

migrations of land-hungry people from the east; another is feudalism; a third is the spread of Christianity. The migrations of hordes of Huns, Goths, and Vandals and the invasions of vikings from the north bring plunder and hardship. For a long time after the fall of Rome, learning almost dies out, except for the monks who live apart from the world, and the Moors who come to live in Spain.

This is the period known as the Dark Ages. The helpless people look to strong men for aid; and, in return for protection, they sacrifice their liberty. They become serfs, poor tillers of the soil, ignorant and illiterate. The strong men live in castles and wage war. They clothe themselves in glittering armor. Some of them feel that they should do something to help the people; so they become knights, and the age of chivalry begins. Christianity becomes widespread in Europe, but its ideals suffer at the hands of the nobles and lords who yearn for power.

A great man, Charlemagne, arises and forms a loose empire; the Franks congregate on the banks of the Rhine and to the east, and Hugh Capet founds a nation that is to become France. In 1066 William of Normandy conquers England and begins the story of that country as a united nation. In Rome the Popes become politically powerful. Then, in order to halt the constant wars, Pope Urban II orders a crusade against the Moslems in Palestine, and until the thirteenth century the men of Europe go warring against the Saracens, as they are called, in the name of Christ.

A man named Marco Polo journeys to the Orient and brings back tales of spices and silks and trade and riches. The Crusaders return with the same stories. They have learned that the world does not consist merely of their castles and moats and fields, but is a large place that is interesting and full of good things. The people hear of these things; they begin to question and study. Towns have begun to spring up; nations are becoming definite. A terrible plague in the thirteenth century creates a shortage of labor in the towns, and the peasants go to the towns to find work. Feudalism begins to decay in the thirteenth, fourteenth, and fifteenth centuries.

The People of the East. During all this time the people of the East, in India, China, Mongolia, and Tibet, had developed a civilization of their own. Buddha had founded a religion in India in the sixth century B. C. A caste system grew up, and millions of natives were in unhappy circumstances. But there were wealthy men in India who brought to their courts rich clothes and brilliant jewels. In China, Confucius gave the people a religion just a short time later; and this great Asiatic land, too, underwent many changes. Here, gunpowder is said to have been invented. Genghis Khan rose in the twelfth century and conquered most of Asia; and after him the rulers of Mongolia and China brought to their courts scholars and wise men who helped give the East a civilization whose glory spread even to Europe. But, as the years went on, little was done to make these great countries forceful; and as Europe awakened as if from a sleep, Asia was to become the goal for Western conquest.

Europe Unfettered. As men sought to trade and to learn, the fetters of feudalism dropped away; and Europe and the world entered a new age. We find new forces—the Renaissance, exploration, the Reformation, and the idea of monarchy directing the fortunes of man. The Renaissance, beginning in Italy, brought the culture of the Greeks back to Europe, and men studied and worked to learn more about life; trade flourished.

But in the middle of the fifteenth century, Constantinople fell into the hands of the Turks and the gateway to the Orient was closed; the search for new routes to carry the goods of the world led to exploration; Columbus discovered America; Vasco da Gama sailed around Africa to India. England, Spain, France, and Portugal began a struggle for land and trade. The period of modern history had begun.

Printing had been invented in the middle of the fifteenth century, and men could now obtain books cheaply; learning spread, and men questioned; some rebelled against the power of the Pope, and Protestantism came into being; the Moors were driven out of Spain.

England grew rapidly in strength, defeated Spain in 1588, and founded colonies on the eastern shores of North America. France explored the interior of the New World, and conflict between England and France grew nearer. The Holy Roman Empire existed merely as a shell, and little German states grew up, one of them being united into a powerful kingdom called Prussia. France lost her foothold in the New World in 1763. As the kings made war on one another in Europe, they became more intolerant. Rumblings of discontent began to appear among the people, and in 1776 the American colonists declared their independence from England.

The New Age. With the founding of the United States, the world swung in another direction, and new forces were felt influencing the lives of men. Science and invention flourished, and industry became a major factor in the world; trade and economics came to dominate world policies; political thought was another force, and conquest was a fourth.

Science and invention made life easier than it had been before; they advanced medicine, astronomy, chemistry, and biology and, in time, made possible looms, steam engines, electricity, railroad trains, automobiles, airplanes, radio, and great ships. All these things accelerated the pace of the world and led to a hitherto unsurpassed advancement of civilization.

In political thought, the idea of democracy as practiced in the United States spread to France, and in 1789 the French people overthrew their king in a Revolution that shook the world. England, too, was forced to give her people more freedom, and the power of the king became less as that of Parliament became greater. In the Scandinavian countries, democratic government dedicated to peace became a fact. The First World War in 1914-18 ended the age of absolute monarchies and stimulated the birth of democracies. But the effects of the same war also caused a reaction against this political theory and set up others. Communism was the result of a revolution in Russia in 1917; Fascism sprang up in Italy and Nazism in Germany. The ideals of democracy and peace were forgotten in many countries. The result was the Second World War of 1939-1945.

In economics, the world, from the time of the American Revolution to the present day, stressed world trade. Nations competed to bring raw materials from foreign lands to make into goods and sell. Tariffs became a major economic problem. As science gave the world new machines, as nations sought more riches, as the world went forward materially by leaps and bounds, the economic structure showed defects in periodic depressions and booms.

Conquest was another force in these years; by conquest the major powers of Europe acquired colonial possessions in various parts of the world. The United States, having settled its slavery question by the Civil War of 1861-65, found itself a nation with important overseas possessions after a war with Spain at the end of the nineteenth century.

World War I, which was the result of conflicting national interests—economic, political, and racial—ended in 1918 with the defeat of the powerful German Empire. Stung by their defeat and resentful of the terms of the Versailles Treaty, the German people began to rearm, and under the dictatorship of Adolf Hitler, head of the Nazi party, they developed the most powerful military machine the world had ever known. By successive acts of aggression, Hitler in 1939 brought on World War II, which became a struggle between totalitarianism and democracy.

Japan, following much the same policy of expansion, began a conquest of China in 1937, and in 1941 attacked the United States. Thus the two hemispheres were joined in a conflict that ended only with the surrender of Germany and Japan in 1945.

For supplementary reading, consult the following articles:

ANCIENT HISTORY

Assyria
Babylon
Chaldea
Egypt
Greece
Iran
Phoenicia
Rome, History of

EASTERN HISTORY

Buddha
China
Chosen
Confucius
Genghis Khan
India
Japan
Kublai Khan
Mongolia
Tibet

MIDDLE AGES

Chivalry
Christianity
England
Feudal System
France
Holy Roman Empire
Italy
Pope

MODERN HISTORY

China
Civil War in America
Communism
England
Fascism
France
Franco-German War
French and Indian Wars
French Revolution
Germany
Great Britain
Industrial Revolution
Italy
Japan
Nazism
Portugal
Reformation, The
Renaissance
Revolutionary War
Russia
Spain
Succession Wars
United States of America
World War (I, II)

HITLER, Adolf (1889-1945). On April 20, 1889, there was born in Braunau, in Upper Austria, a boy who was destined to become one of the most powerful, as well as one of the most hated and feared, men of his generation. Hitler was born of middle-class parents in Austria. As a boy he was sickly, willful, and a poor student. Left an orphan at the age of nineteen, he went to Vienna, where he lived for five years in poverty. He worked only occasionally, and at odd jobs. Frequently he obtained food and lodging from a charitable foundation set up by a Jewish businessman. Hitler's violent hatred for the Jews and other peoples not clearly of Germanic descent is said to have begun at this period. He resented getting alms, especially from "non-Germans."

Rise to Power. In 1912, at the age of twenty-three, Hitler left Vienna for Munich, Bavaria. He enlisted in the Kaiser's army at the outbreak of World War I, and was wounded and gassed. For conspicuous service he received the Iron Cross. After the war he joined a small group known as the German Workers' Party, becoming head of propaganda. Hitler's skill as an orator and his fanatical devotion to the party caused it to grow rapidly. In 1920 he originated the swastika flag as the party emblem. The organization added "National Socialist" to its name, and became the present Nazi party.

In 1923 the Nazis, aided by Ludendorff and his followers, attempted to take over the government of Bavaria. This "Beer Hall Putsch" failed, and Hitler was sen-

GERMANY'S MODERN CAESAR
Reichsfuehrer Hitler, unquestioned dictator of millions of Germanic people.

tenced to five years' imprisonment. However, he was released within ten months. While in prison he wrote *Mein Kampf* (My Battle), an audacious book that outlined his plan for German liberation and conquest. The book seemed like the dream of a madman, but almost every scheme he advanced was later put into effect. The Hitler movement made rapid progress against the unstable Weimar Republic that liberal Germans were attempting to support. The Nazis' propaganda against the Versailles Treaty, their promises to revive Germany's past glory and to relieve poverty and unemployment, all had their effect. In 1932, when Hitler ran for the Presidency against General von Hindenburg, he received about 15,000,000 votes.

Hitler's dictatorship began in 1933, when he was appointed Reich Chancellor. The Reichstag granted him dictatorial power, and in 1934, on the death of Von Hindenburg, Hitler assumed the office, although not the title, of President. He preferred to be known only as Chancellor and Der Fuehrer (The Leader). The republic, in fact, had died, and the Third Reich begun.

Conquest. From the moment he came into power, Hitler put Germany on a war footing, and the energies of the whole people were directed toward one goal. When Hitler, in March, 1936, moved his Nazi troops into the demilitarized zone east of the Rhine, the German march of conquest began.

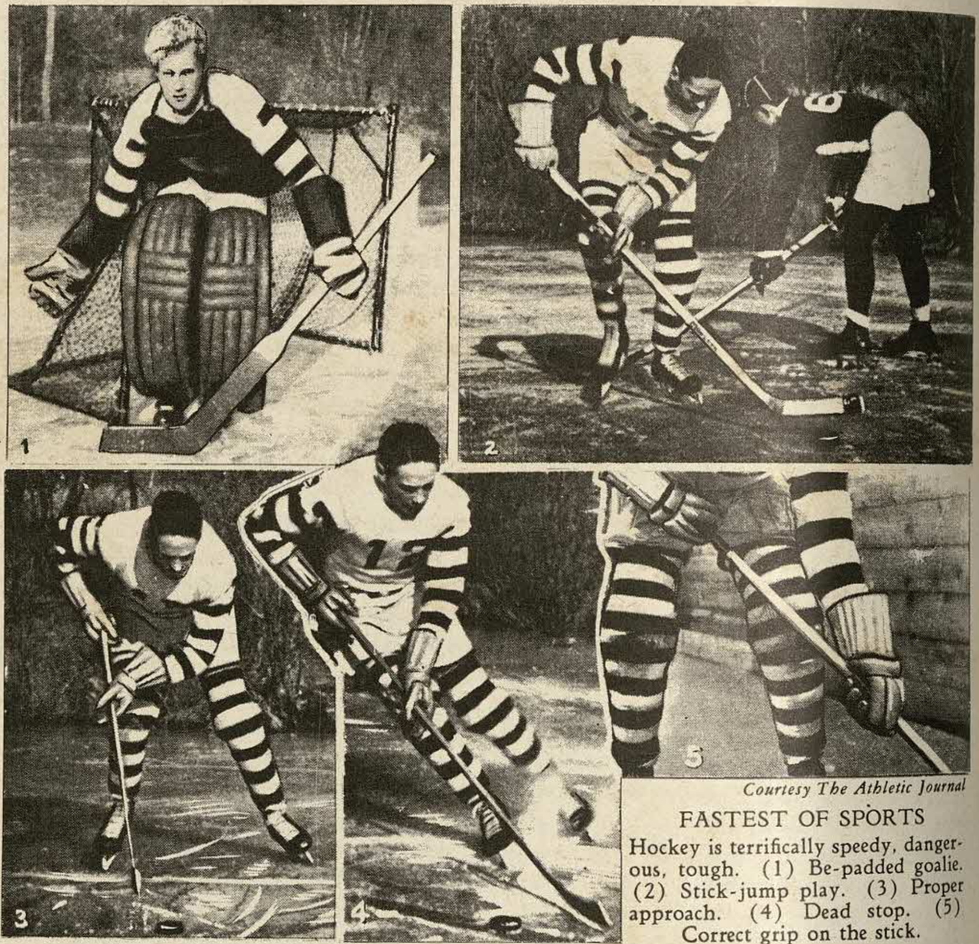
One European country after another then felt the power of Hitler. Austria was annexed in March, 1938; a year later, Czechoslovakia was dismembered and Lithuania forced to yield Memelland to the Reich. When Hitler invaded Poland in September, 1939, France and Great Britain declared war on Germany; the Second World War had begun. At first, Hitler's forces swept all before them, until most of Europe was under German domination. Then, in June, 1944, the Allies landed on the Normandy coast, and in March, 1945, invaded Germany from east and west. The end came on May 7, with the official surrender of the German forces at Reims.

But Hitler did not live to see the end of the war. If persistent reports are to be credited, he committed suicide in Berlin on April 30. See NAZISM.

HITT'ITES. Only a name remains to tell the modern world of an empire that once dominated the eastern Mediterranean seacoast. This was a Hittite empire that extended over Asia Minor and Syria, and was inhabited by a people who continually menaced the Assyrians and Egyptians. The Hittites themselves were a warlike people, living between the Dead Sea and the Mediterranean long before the time of Abraham. In 717 B. C., however, they were conquered by Sargon of Assyria, and they disappeared from history as a people and as an empire.

HOANG HO. See HWANG HO.

HOBBEMA, *hob' e mah.* MEINDERT (1638-1709). As a landscape painter of the Dutch School, Hobbema ranks second only to his friend Ruysdael (which see). He was born, lived, and died in Amsterdam, and there his artistic career ended with his marriage in 1668. Hobbema painted the quiet aspects of nature. Among his paintings are *The Avenue, Middelharnis* and *The Water Mill.*



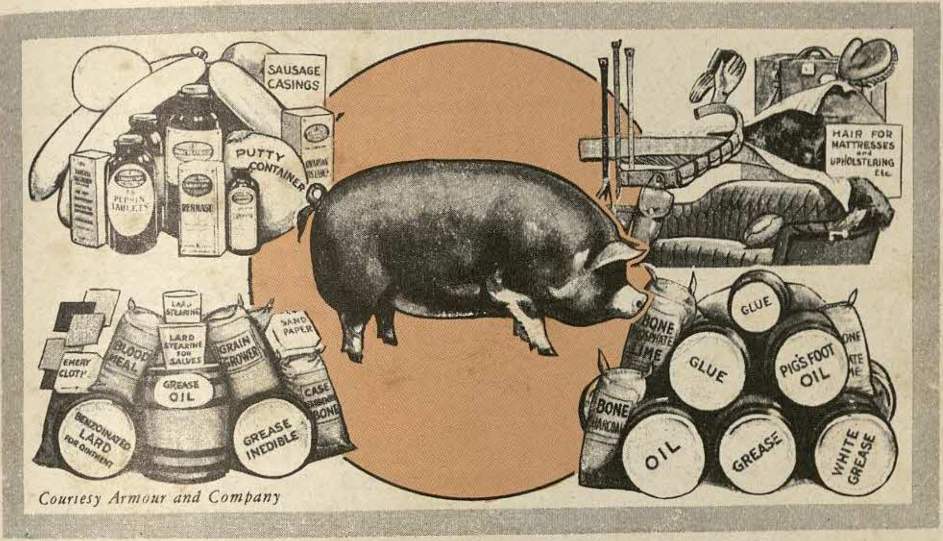
Courtesy The Athletic Journal

FASTEST OF SPORTS
Hockey is terrifically speedy, dangerous, tough. (1) Be-padded goalie. (2) Stick-jump play. (3) Proper approach. (4) Dead stop. (5) Correct grip on the stick.

HOCK'EY, or SHIN'NEY. Fastest team sport in the world is ice hockey, Canada's national pastime, and an increasingly popular game among athletes and sports enthusiasts in the United States. By far the greatest interest in Canada and the United States is centered in the National Hockey League, a professional organization composed of teams representing cities on both sides of the border. At the end of the season the winning team is awarded the famed Stanley Cup.

Numerous other professional and amateur leagues exist in the United States and Canada; and each year sees more players participating, more teams formed, and more persons witnessing the contests. Probably the greatest force in popularizing the sport has been the introduction of artificial freezing, permitting the games to be played in indoor arenas.

The game is played on a rink 200 feet long and 85 feet wide in the professional leagues. Ten feet from either end of the rink are the goals. The space from goal to goal is divided into three *zones,* each sixty feet wide; in the center of the rink is a small circle for the *face-off.* Six players compose the team, consisting of the *center, right wing,* and *left wing,* known as *forwards; left defense, right defense,* and *goalie.* The object of the game is to knock a *puck,* a hard rubber disc one inch thick and three inches in diameter, into the goal of the opposing team by means of a long, hardwood stick curved into a blade.



Courtesy Armour and Company

THE BARNYARD'S WALKING DEPARTMENT STORE

Most valuable of all farm animals, hogs produce not only meat but a large number of important by-products, from ointments to baseball mitts. Meat packers claim they use "everything but the squeal" in dressing hogs for market.

A face-off, which begins the game and resumes the action in the case of an *off-side* or a *goal,* is a play in which the referee drops the puck between two players of opposite sides, who attempt to secure it with their sticks and pass it to a teammate. The game is divided into three periods of twenty minutes each, and each goal counts one point. According to the rules of the game, a player may not pass the puck to a teammate from one zone into another, unless the receiving player was in the same zone as the puck carrier at the time the pass was made. If the score is tied at the end of the game, an extra period of ten minutes is played.

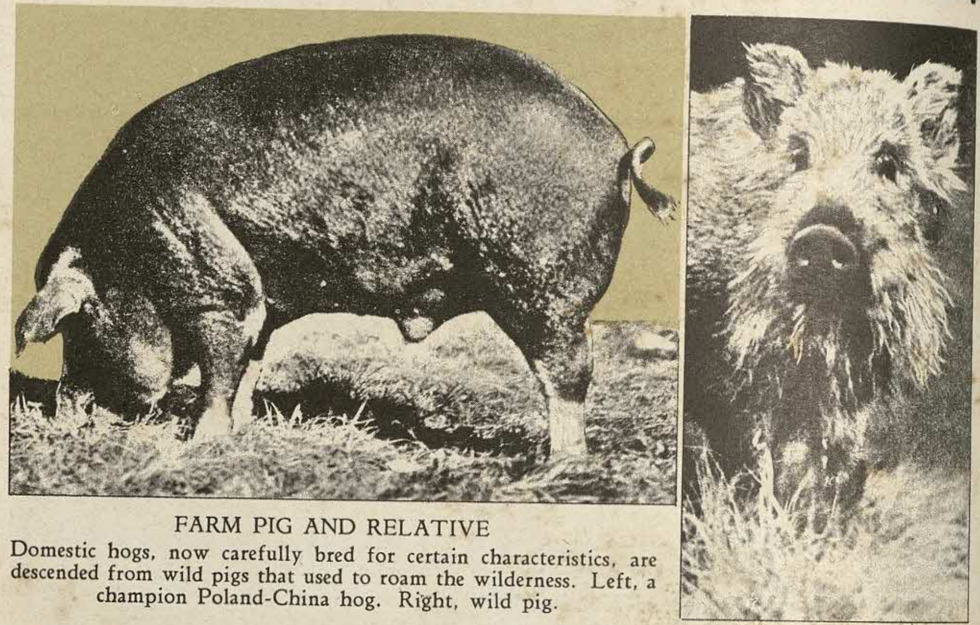
Hockey, as it is played today, was developed in Canada, being furthered by McGill University and the Victoria Hockey Club. The first attempts to draw up a set of rules were made about 1881. A variation of hockey, usually played outdoors by boys, is *shinney*. Any number of players may be used; the rules vary, and often a ball is used instead of a puck. A popular game among both boys and girls is *field hockey,* played without skates, on a grass field, and with a ball instead of a puck.

HOF'MANN, Josef (1876-1957). One of the few child prodigies who became a great artist in maturity, Josef Hofmann made his first public appearance in Europe at the age of six and became a world-famous concert pianist and a noted composer.

He was born at Cracow, Poland, and his father began teaching him almost in infancy. At seven, Hofmann was a pupil of Rubinstein, and at nine was making a concert tour of Europe. He toured America in 1887; but a schedule of fifty-two concerts in ten weeks proved too strenuous, and the child began to show fatigue. A protest of the Society for the Prevention of Cruelty to Children ended the tour.

Resuming his public appearances in 1894, Hofmann played for enthusiastic audiences all over the world. After making his home in the United States, he became an American citizen and was the director and dean of the Curtis Institute of Music in Philadelphia from 1926 to 1938.

HOG. The ancestors of the present-day "porkers" roamed the earth millions of years ago; their life is believed to have covered a space of time between 3,000,000 and 6,000,000 years. A relative of one of the



FARM PIG AND RELATIVE

Domestic hogs, now carefully bred for certain characteristics, are descended from wild pigs that used to roam the wilderness. Left, a champion Poland-China hog. Right, wild pig.

hog's early ancestors was as big as a horse, but it had such short teeth and was so clumsy that it was soon exterminated by fiercer flesh-eating animals. The direct ancestors of the hogs of today were the wild boars of Europe, swift as a horse, fierce, and armed with gleaming, razorlike tusks. Early Saxon history tells of the great herds of semi-domesticated hogs that roamed the forests, living on nuts and acorns.

The Domestic Hog. The hog has a pear-shaped head with a pointed or blunt snout, which is of value in "rooting" in the ground. Its clumsily and stockily built body is covered with a thick skin and short, stiff hairs called bristles. Its hoofs are cloven.

Hogs are *omnivorous,* which means that they eat both vegetable and animal matter. Their diet should consist chiefly of corn and other grains. Buttermilk and skimmed milk are also valuable hog feeds, as are tankage and garbage. Though many people regard it as a filthy animal, the hog really prefers a clean pen to a dirty one. Cholera is the hog's greatest enemy.

Types and Breeds of Hogs. There are two types of domesticated hogs: *bacon* and *lard.* The bacon type has a long, narrow body, with a rather high percentage of lean. The lard type is a broad, deep, fat-backed animal with a high percentage of fat in its body. An intermediate type of bacon-lard hog is now raised, the Berkshire and the Hampshire imported from England being the favorites. Duroc-Jersey, Poland China, and Chester White hogs are also popular in the United States. Hogs generally reach a market size of 200 to 250 pounds in about six months. Good sows will raise two litters a year, each litter consisting of eight to ten pigs.

Uses of the Hog. No other farm animal is so completely used as is the hog. Fully two thirds of its dressed weight is meat; its blood is used as feed, its bones as fertilizer, its hair for brushes, and its skin for leather. The principal food products of the hog are lard, bacon, ham, shoulder, sausage, pork chops, and a host of less important foods.

Extent of the Swine Industry. Though hogs are raised throughout most of the United States and Canada, the industry centers in the great Corn Belt states of Iowa, Illinois, Indiana, Ohio, Nebraska, Kansas, and Missouri. Over 50,000,000 hogs are raised in the United States in an average year. Other leading hog-raising countries are normally China, Russia, and Germany.

HOHENZOLLERN, *ho'en tsohl urn.* On November 10, 1918, William II, emperor of Germany, relinquished his throne and fled to Holland, thus ending the reign of the House of Hohenzollern, ruling family of Prussia and, from 1871, of the German Empire. Dating from the twelfth century, the name was derived from the Castle Zollern (Hohenzollern) in Swabia, as part of medieval Germany was called. Third of the Hohenzollerns to become German emperor, William II lost his throne at the close of World War I, when his subjects revolted and set up a republic. For his six sons, Hohenzollern became simply a surname.

Under the Prussian kingdom, there were several famous members of the family; among them were Frederick William, the Great Elector, and Frederick II, called Frederick the Great. After Bismarck succeeded in uniting the various kingdoms under one empire in 1871, William I, Frederick III, and William II ruled.

The Hohenzollerns, with but few exceptions, were militarists and adhered to the theory of the "divine right of kings." Frederick III, the father of the last kaiser, was one of the rare democratic members of the family, but his reign was for only a hundred days. The son was stubborn and antidemocratic, and favored a strong army and navy. To escape revolt in his own country and a threatened trial by the nations of the world as an arch criminal, he fled in 1918 to neutral soil at Doorn, Netherlands.

William's family remained in Germany, and several of his sons became influential under the dictatorship of Adolf Hitler, who came into power after the fall of the Second German Reich in 1933.

When Germany invaded Holland in 1940, William II was allowed to remain at Doorn, and here he died in 1941.

Consult the following titles for additional information:

Franco-German War
Frederick II
Frederick III
Frederick William
Germany
William I
William II
World War I

The Art Institute of Chicag

BY HOLBEIN, THE YOUNGER

Here is the younger Holbein's brilliant portrait of th great scholar Erasmus.

HOLBEIN, *hohl'bine.* Outstanding in the history of German culture are the Holbeins, father and son, sixteenth-century painters.

Hans Holbein, the Elder (about 1460-1524). Following in the glorious tradition of the early Flemish and Italian masters, Holbein the Elder devoted his talent to Biblical scenes and the lives of the saints. Among his best-known works are *Nativity of the Virgin, Coronation of the Virgin, Mary's Presentation in the Temple, Martyrdom of Saint Sebastian,* and *Well of Life.* He did most of his work at Augsburg and Frankfort.

Hans Holbein, the Younger (1497-1543). Holbein the Younger was born in Augsburg, first studied with his father, and then studied and lived in Basel for many years. From 1530, he made his home in England. Here, as court painter, he executed the brilliant portraits of the notable personages at the court of Henry VIII which now comprise the famous Windsor collection. Previous to this appointment, he had been painter to Sir Thomas More. Although his portraits brought Holbein fame, he also painted many sacred subjects, among them being *Flagellation, Last Supper, Virgin and Child, Man of Sorrows and the Virgin,* and *Madonna of the Burgomaster Meyer.*

HOL'IDAY. Gay days of rest and play, holidays are festive occasions commemorating some religious date or occurrence or some secular incident of importance. They are days set aside by the local or national government, on which workers are released from routine duties. In the United States there are no strictly national holidays, since such days are fixed by the states or towns. It is presumed that everyone will enter into the spirit of the occasion and will participate in proper observance. In the United States the principal holidays are New Year's Day, Washington's Birthday, Decoration Day, Independence Day (July 4), Labor Day, Thanksgiving Day, and Christmas.

In Canada, where they are fixed by national laws, the chief holidays are Sunday, New Year's Day, Christmas, Empire Day (May 24), Dominion Day (July 1), and Labor Day (the first Monday in September.) Thanksgiving Day in the United States is determined by Presidential proclamation, and accepted by custom in all the states.

The following holidays are described in this work under separate titles:

Christmas
Independence Day
Labor Day
Memorial Day
New Year's Day
Thanksgiving Day

HOL'LAND, KINGDOM OF. See NETHERLANDS, THE.

HOL'LY. "The holly branches shone on the old oak walls" of the old European castles as an important part of the holiday decorations. Gay, cheerful holly wreaths with their vivid, glossy, green leaves and bright-crimson berries have always been representative of the spirit and joys of the Christmas season. As early as Roman times, wreaths of holly were sent to friends as expressing good wishes for the new year.

Used everywhere for holiday decorations, the holly is a tree or shrub of the genus *Ilex* and is found widely in Europe and America. European varieties grow to twenty feet in height and have the familiar shining, green leaves, bearing thorny spines about the edges. Found in all parts of the country, the American holly is very similar.

The flowers of the holly tree are white. The red berries appear in September and remain to brighten the landscape all during the winter. The shrub is frequently cultivated as a hedge, and the fine white wood is used for knife handles and similar articles. It is sometimes stained to imitate ebony.

"MERRY CHRISTMAS!"
Sprigs of holly seem almost to pronounce the words. The plant is found almost everywhere.

HOL'LYHOCK. Old-fashioned flower gardens usually include hollyhocks, tall plants belonging to the genus *Althea* of the mallow family. Hollyhocks have enjoyed many waves of great popularity, but have always been admired. They are so neat and so stately, make a house appear so homelike, transform an old fence into a thing of beauty, guard a perennial border, and invite all the bees of the neighborhood. The single flowers are like fairy hats; the doubles are like pompoms. The colors one can choose are lovely: pale lemon, delicate pink, pure white, clear red, dusky maroon, and unusual purple.

HOLMES, Oliver Wendell (1809-1894). Although he is noted as being one of the greatest American authors, had Oliver Wendell Holmes written an autobiography at the age of forty-eight, when most men have established their place in the world, he would have written only of a man of science, of a successful physician, of a professor of anatomy at Harvard University. It was at this age that he began to write.

Holmes was born in Cambridge, Mass., where he spent most of his life. He entered Harvard at the age of sixteen and was graduated in the class of 1829, to which belonged several men who became famous in various fields. Undecided as to what profession he was best fitted for, Holmes at first studied law, but gave it up to enter medical college. After two years at Harvard, two more in Paris, and a short time in Edinburgh, he received his medical degree in 1836. He then began the practice of medicine in Boston. Later he was appointed lecturer on anatomy at Dartmouth, and in 1847 was given the chair of anatomy at Harvard.

Although Holmes had occasionally written and published humorous poems that made him famous around Boston, it was not until 1857 that he became generally known in the literary world. With the founding of the *Atlantic Monthly,* in 1857, James Russell Lowell, the first editor, persuaded his friend Holmes to contribute a serial to the new magazine, with the result that Holmes produced *The Autocrat of the Breakfast Table.* This series of witty, informal essays gave its author a permanent place in American literature.

He later contributed three other series of *Autocrat* papers—*The Professor at the Breakfast Table, The Poet at the Breakfast Table,* and *Over the Tea Cups.* Among his works are three novels—*Elsie Venner, The Guardian Angel,* and *A Mortal Antipathy.* After a tour of Europe in 1886 he wrote *Our Hundred Days in Europe.* Included among his still-popular poems are *The Last Leaf, The Chambered Nautilus,* and *The Wonderful One-Hoss Shay.*

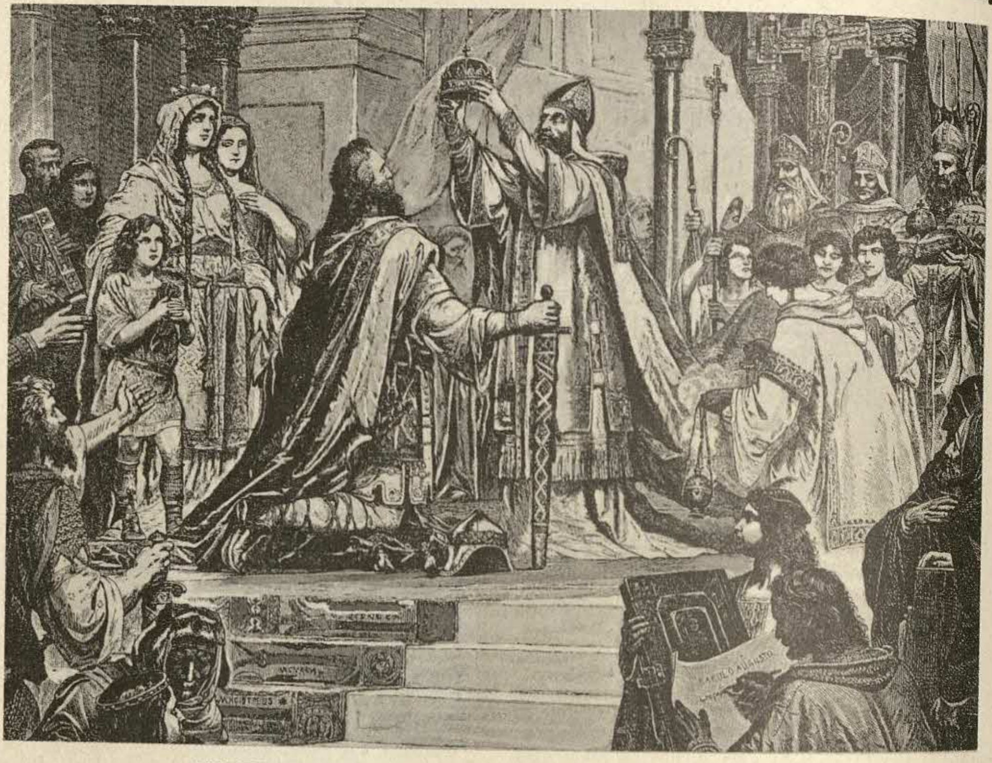
HOLY ALLIANCE. Despite its name, there was nothing very sacred about this league formed by Russia, Prussia, and Austria in September, 1815. Actually it was an agreement growing out of the religious ardor of Alexander I of Russia, Francis of Austria, and Frederick William III of Prussia.

Through this agreement they announced to the world that their mutual relations would be governed by the principles of Christianity, and that they "would lend each other aid and assistance." It was ostensibly an attempt to promote justice, peace, and charity within the countries taking part, and to extend happiness and good-feeling to the world in general. All Christian powers were invited to join, and of the European powers, only Great Britain, Turkey and the Pope did not sign the agreement. In effect, the Holy Alliance became the tool to maintain the "divine right of kings." After about 1848 its influence waned.

HOLY CITY. All great religious groups have a city which to them is sacred—their holy city. To all Christians it is Jerusalem; to the Roman Catholics it is Rome, where the Pope resides. Mecca and Medina are holy to the Mohammedans; Benares to the Hindus.

HOLY FAMILY. The tender story of the Christ Child inspired early artists to paint the Virgin Mary and her Son, whom they called the Holy Family. They became the favorite subjects of the medieval and Renaissance masters. In the earlier paintings, only the Child and His mother were shown, but later artists introduced such holy figures as Saint Catherine, Saint John, and Saint Joseph. The first paintings of the Holy Family were done in the sixth century by Byzantine artists. Raphael's *Sistine Madonna* is the best-known of the Holy Family pictures. See Madonna.

HOLY GHOST. In the Christian doctrine of the Trinity, the third member, coordinate with the Father and the Son, is the Holy Ghost, or Holy Spirit. God's work is carried on by the "inspiration of



FORERUNNER OF THE HOLY ROMAN EMPERORS

Charlemagne, greatest of medieval Europe's military figures, was crowned Emperor of the West at Rome in 800 A. D.

the Holy Spirit." As a plant may be one and yet have stem, leaf, and flower, so the Trinity is believed to be the triune Cod—Creator, Savior of man, and guiding Spirit that fills the hearts of men on earth.

HOLY GRAIL. See GRAIL, THE HOLY.

HOLY LAND. See PALESTINE.

HOLY ROMAN EMPIRE. For a thousand years, there existed in Europe an empire totally unlike any other in the world. This was the Holy Roman Empire, which was, as Voltaire said, "neither holy, nor Roman, nor an empire."

Theoretically the empire was composed of all the Christian nations of Western Europe. In other words, it was supposed to be the ancient Roman Empire in medieval dress. Actually, however, it was a loosely bound group of German and Italian states, each ruled by a prince who governed as he saw best and warred against whomever he pleased.

This empire had its early beginnings with Charlemagne, who, in the year 800, had himself crowned emperor of the lands he had subdued. At the time, he was considered the successor of the rulers of the old Roman Empire. In 962, Otho the Great became head of the empire and adopted the title *Roman Emperor*. Frederick Barbarossa, who became emperor in the twelfth century, added *Holy* to the name, and the full name lasted until 1806, when Francis II discarded it, having adopted the title *Emperor of Austria* in 1804.

Most of the time, the empire existed in name only; but occasionally, when some strong man became head, such as the Hohenstaufen emperors in the twelfth and thirteenth centuries, there was a degree of unity. A weak ruler, however, could not hold the countries together. The Holy Roman Empire almost became a true empire of Europe in the sixteenth century when Charles V ruled as monarch. He, however, was unable to hold his various thrones and abdicated in 1558. The House of Hapsburg, of which he was a member, continued on the throne until finally, in the nineteenth century, the Holy Roman Empire became the Austro-Hungarian Monarchy, which came to an end in 1918.

HOLY WEEK. Celebrated by prayer and fasting, Holy Week honors the last days of Christ on earth and is one of the most important religious periods of the Christian faith. The week opens with Palm Sunday, the day of Jesus' entry into Jerusalem. Special days are Spy Wednesday, the day of Judas' betrayal; Holy Thursday, the day of the Last Supper; and Good Friday, the day of the Crucifixion. The week ends with the triumphal Resurrection on Easter Sunday.

The Modern Science of BETTER LIVING

HOME ECONOM'ICS. The organized study of homemaking—home economics—is one of the youngest of the sciences, although homemaking itself began before the time of written history. As man progressed from cave dweller to a civilized being, the highest type of home became an abode of grace and orderliness. Through the centuries, the world over, there have been women who have managed their homes wisely, reared sturdy sons and daughters, and made of family life the beautiful thing it can be when purity of heart, charm of manners, health of body, and strength of character dwell within the household. The arts of homemaking have been taught for generations, with the mother as teacher and the daughters as pupils.

Yet the need of organized and professional study of this subject was apparent to many thoughtful women before the movement got under way in the nineteenth century. In this movement America took the lead. The nineteenth century marked the change from older ways of living. The growth of cities and the wider use of machinery created new problems. Gone were the days when women fashioned garments from cloth woven on their own looms, when they made their own soap and yeast, and performed a hundred and one tasks that today are done outside the home or by labor-saving appliances within the home.

New interests, too, were claiming the homemaker's attention—the suffrage movement, clubs, higher education for women. Young women—future wives and mothers—were seeking new fields in the industrial world, in teaching and the other professions. And so there was created a need for the science we call home economics, that the home and family, man's dearest heritage from the past, might be preserved in a changing world.

The founder of the home-economics movement was Ellen H. Richards (1842-

"PLEASANT DREAMS"
Making a bed right is a fine art: takes lots of practice. This girl is learning how.

1911), a true American pioneer. In 1870, as Miss Ellen Swallow, she demanded and received permission to study at the Massachusetts Institute of Technology, in Boston. The first woman to be admitted there, she not only received a degree in science, but was given a position as teacher of chemistry of sanitation. In 1875 she married Professor Richards, who taught in the same college.

To the end of her life, Mrs. Richards showed her classes how to apply the principles of science to everyday life. Her influence extended far beyond "Boston Tech." She gave lectures, wrote for papers and magazines, organized clubs, and persuaded the school board of Boston to open classes for the teaching of cooking and sewing. She saw her ideas grow in the minds of men and women, and schools the country over began introducing home-economics courses. Three years before her death, Mrs. Richards organized the American Home Economics Association, to aid the movement.

Today, home economics is recognized as a standard science in colleges and normal schools, and courses are given in private schools, high schools, and in the grammar grades. The housewife who cannot attend school may use her home as a laboratory, for she has at her disposal a vast amount of literature—magazine and newspaper articles, cook books, pamphlets issued by manufacturers and public utilities, and government bulletins—as well as public lectures, demonstrations in stores, and radio talks.

The Camp Fire Girls, Girl Scouts, and Junior Red Cross Societies all have practice work in courses that teach responsibility for health. Home projects are a part of the activities of the 4-H Clubs, and in Young Women's Christian Associations, home-betterment courses have been very popular.

The United States Government also is interested in helping homes and families. For example, its Bureau of Human Nutrition and Home Economics, in the Agriculture Department, conducts researches in home problems and makes its findings available to all American households. In 1914 Congress passed the Smith-Lever Act, providing for demonstration agents to give groups of women and girls in rural areas practical lessons in cooking, sewing, and household management in the home. Congress also passed the Smith-Hughes Act in 1917, by which money is appropriated to the states to pay salaries of teachers of vocational subjects. Through these and other agencies, the study of the "art of right living" has become available to all.

We have said that home economics is a science. It is really a science of many sciences, for any comprehensive study of the art of right living takes us far afield—across the boundaries of chemistry, biology, sanitary science, physics, agriculture, social studies, the applied arts. The work of the agencies dealing with home-economics matters is very wide in scope. Some of the divisions making up this field of study are as follows:

Courtesy Armour and Co.; Iowa State College of Agriculture and Mechanical Arts

WELL-RUN HOMES ARE HAPPY HOMES

These girls are learning how to keep house efficiently. Cooking (left) calls for skill. Right, learning how to slip-cover a chair.

Food and Nutrition. The food problem is studied from various standpoints—planning and cooking of meals, proper serving, food preservation, the relation of food to health, the economic status of different groups, ways of adjusting the income to family requirements, institutional cooking, diets for the sick, and kindred subjects.

Basic to any study of food and nutrition is the relation of food composition to the needs of the healthy body. An adequate diet must furnish five things: (1) energy material; (2) material for building new tissue and repairing worn-out cells; (3) adequate amounts of mineral matter to regulate body activities and provide nourishment for blood, bone, and other tissues; (4) vitamins, necessary to promote health and growth and to prevent rickets, scurvy, and other dietetic diseases; (5) water. Our foodstuffs are composed of carbohydrates, proteins, fats, mineral elements, and water, with vitamins distributed in them in varying amounts. In a proper selection of food, the diet is so balanced that the requirements of health are adequately taken care of.

Economic Studies. These studies cover such subjects as standards of living, budgets, and household management in general. Just as the success of a business depends on the intelligence, ability, and foresight of its manager, so a comfortable, happy home depends on the same qualities in its manager, plus the even higher assets of an artistic sense and a spirit of service.

Training in household management deals with the problems of providing nourishing and palatable meals at reasonable cost, of clothing the family within its means and of keeping the clothing clean and in good repair, and of seeing that the house is bright, clean, and homelike. It includes the proper arrangement of furniture and time- and labor-saving methods. In the well-managed home, children are trained in habits of orderliness, and the home atmosphere is one that makes for the happiness of family and friends.

Clothing and Textiles. The clothing problems in the house are considered from the standpoint of production, or making, and of consumption, or selecting. This division covers plain sewing, decorative stitches, mending and darning, the designing and making of garments, and renovation, care, and storage of clothing. It includes such studies as special clothing budgets for the college girl or business woman, the selection of fabrics, the cost and wearing qualities of various textiles, and the relation of clothing to health. Good judgment in the selection of dress goods, ready-to-wear clothing, or fabrics used for draperies and upholstery is a valuable asset.

Housing and Equipment. A house planned for convenience, health, and artistic quality is truly a "house beautiful." This division is of vital importance to the happiness and welfare of the family. Whether the dwelling is a large house with basement and attic, or whether it is a small city apartment, the need is there for well-arranged rooms, proper lighting, heating, and ventilation, sanitary plumbing, proper disposal of sewage, a pure water supply, and freedom from insect pests. Included in courses on housing and equipment is the proper selection of furniture and household appliances.

Social Relationships. Modern social studies are closely related to many problems of the home and family, and while studies in this field are not everywhere included in home-economics courses, the trend today is in that direction. This field is a very wide one, for it includes social relationships as they affect different members of the family, as well as the social aspects of the family as a part of the community. The purposes of these studies are to make home conditions more stable, to present to children the importance of co-operation in all family relationships, and to train them for citizenship. Training in manners and morals is as important as teaching physical education or the vocational subjects.

Arts and Crafts. Interior decoration, pottery making, weaving, upholstering, rug making, and kindred activities are taught in many schools as vocational subjects directly related to or a part of the regular home-economics courses. Interior decoration itself is a profession, and an exacting one, but a knowledge of its basic principles—the laws of proportion and harmony, of line, color, and appropriateness—is invaluable to the homemaker who realizes that there can be no complete and joyful living without beauty. In regard to the teaching of handcrafts, educators recognize the importance of preserving the old arts in an age dominated by the machine.

Many articles furnishing additional material, relative to home economics, are scattered through these volumes. See, for example:

Boots and Shoes
Cooking
Diet
Dress
Electricity
Floor Covering
Food
Furniture
Heating and Ventilation
Housing Problem
Nutrition
Vitamins

HOMER.

Read Homer once, and you can read no more;
For all books else appear so mean, so poor,
Verse will seem prose; but still persist to read,
And Homer will be all the books you need.

Quite true is this passage from the Duke of Buckinghamshire's *Essay on Poetry,* for Homer's *Iliad* and *Odyssey* are two of the greatest works of literature ever composed. Of course, no one knows who Homer was. It is entirely possible that a man named Homer never even lived in Greece. But that does not detract from the beauty and grandeur of these two epic poems of Greek literature; and whoever, or whatever group of men, did compose them under the name of Homer deserves all the praise that has been heaped upon that name in the past 3,000 years.

The popular belief is that Homer was an individual, blind and poor, who lived sometime between the twelfth and seventh centuries B. C. According to an anonymous epigram, seven cities of Asia Minor and the Aegean area claimed to be his birthplace. The city of Smyrna appears to put forth the strongest claim, and Chios most likely was the place where he lived longest. His place of death is said to have been Ios. Where the *Iliad,* the story of the Trojan War, and the *Odyssey,* the tale of the wanderings of Ulysses, were composed is not definitely known; but it is supposed that they were brought to the Greek mainland from the Ionian Islands and Asia Minor.

According to records, Lycurgus took transcriptions of the *Iliad* to Sparta, and both *Iliad* and *Odyssey* were well known in Athens at the time of Solon. Probably a good part of the *Odyssey* and *Iliad* were folk legends transcribed by Homer. For many years a group of bards existed in Chios who claimed that Homer was their founder. The *Homeric Hymns,* a collection of works dedicated to the gods of Greece, were said to have been composed by Homer, but it has been found that they were probably composed some years after his time.

THE FATHER OF ALL POETRY
Homer, earliest named bard of ancient Greece.

HOME'STEAD. When the thirteen American colonies had gained their independence and a little later had formed themselves into a united nation, they looked out to the West and saw a new and little explored continent awaiting development. Washington and the other leaders of his time made a beginning on the tremendous work by building canals, forming land companies, and starting a national highway toward the West. But the great impetus came with the invention of the railway and the steamboat. With the aid of these two methods of transportation, the vigorous American pioneers completed in a little more than a century the immense task of settling the area between the Alleghenies and the Pacific coast.

As practically all this land belonged originally to the national government or was later ceded to it, the question of supreme importance was how the ownership was to be transferred from the government to the individuals. Usually, in new countries, the government gives grants of land covering great areas to powerful individuals or companies, who keep it under their control and develop it through tenants or hired labor. But this did not fit well with the spirit or the institutions of the United States, and the government, after half a century of experimenting, definitely adopted a policy of granting small tracts of land to the men who actually settled on them and worked them.

In 1862 Congress passed the first of several homestead laws, under which millions of acres of free Western land were settled. The first tract granted — to Daniel Freeman, near Beatrice, Neb.— is now a National Monument. Most tracts contained 160 acres, but some in less-desirable areas were larger. Few such homesteads are now available in the continental United States, and the Small Tract Act of 1938, under which no more than five acres of public land may be acquired, has largely replaced the earlier homestead laws. Alaskan homesteads are, however, available, and after World War II, veterans were encouraged to take them. In Canada, where large tracts also await settlement, each province has its own homestead laws.

HONDURAS, *hon doo'ras.* With high, cool mountains that slope down to hot lowlands along the coast, Honduras is chiefly a tropical country touching both the Pacific Ocean and the Caribbean Sea. Although the United States has large investments in Honduras, the country is not widely developed, despite its rich mineral deposits and fertile lands.

The Land and Its Products. The area of this Central American republic is 44,480 square miles. In the center of the country is a high plateau region from which mountain ridges slope to the lowlands of the eastern coast. Cutting across these mountains is a large, fertile plain. Running through this plain is the Ulua River, which flows into the Atlantic Ocean, and the Choluteca River, emptying into the Pacific Ocean. The climate in the mountains is pleasantly cool, but in the low coastal region the climate is hot, damp, and unhealthful.

Honduras is chiefly an agricultural country and produces a large variety of crops, principally tropical fruits such as bananas, coconuts, and pineapples. Millions of bunches of bananas are raised yearly and are the chief export. Other important crops include coffee, tobacco, sugar cane, corn, rice, henequen, abacá, rubber, and cacao. Large herds of cattle graze on the upland regions. The extensive forests of the highlands yield valuable timber, such as mahogany, rosewood, and cedar. Rich mineral deposits include silver, gold, lead, zinc, copper, antimony, manganese, iron, and coal.

The People. Most of the population of Honduras is composed of Indians, many of them with a mixture of Spanish blood. Many of the people are in a primitive state, and there is a high rate of illiteracy, although, theoretically, education is free and compulsory. The few Americans and Europeans who live there largely control the resources of the country. The population is about 1,828,000. Important cities include Tegucigalpa, the capital; San Pedro Sula; Amapala, the chief Pacific port; and La Ceiba, Tela, Puerto Cortes, and Trujillo, the largest Atlantic ports. Although there is freedom of worship, the Roman Catholic faith prevails.

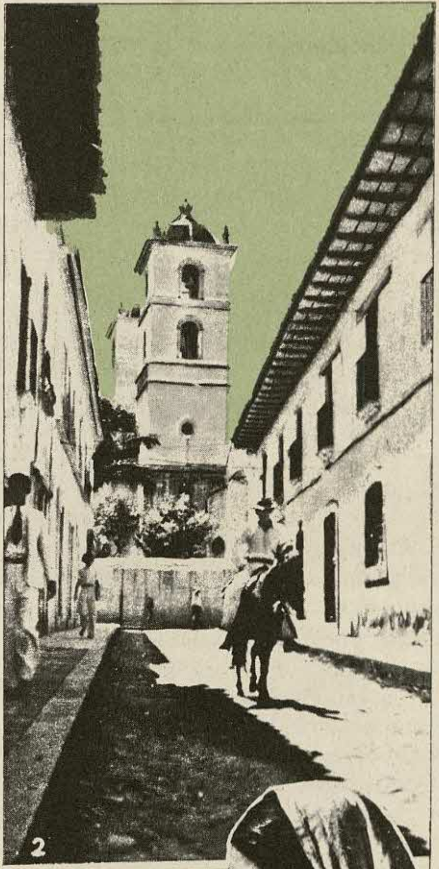
The government is composed of a Congress of Deputies, a President elected for a six-year term, and a Permanent Commission of five members.

History. Honduras was discovered by Columbus in 1502 and was later settled by the Spaniards. In time, it became part of the Captaincy-General of Guatemala, which included all Central America. Honduras declared its independence from Spain in 1821 and remained part of the Central American Federation until it became an independent state in 1838. A prolonged boundary dispute with Guatemala was not settled until the 1930's. Another, with Nicaragua, almost caused war in 1937. Honduras has also been torn by civil wars and invasions. It declared war on the Axis nations in both World Wars and belongs to the United Nations.

HONEY. Nature's secret of making honey has never been learned by man. The bees gather the nectar from the flowers and carry it to their hives, where it is ripened into honey. When brought to the hive it is thin and almost tasteless, like sweetened water. Just what the bees do to it is not fully understood. A careful observer will readily see that they move it from place to place within the hive several times during the process. A constant fanning of wings apparently helps to evaporate the excess water, and a chemical change takes place which makes the finished product the finest sweet known.

Honey varies greatly in quality according to the source from which the nectar comes. Some honey is light in color and of the finest quality, while some honey is dark, strong, and entirely unpalatable. As a rule, the markets favor the honey of light color and mild flavor, and such a product sells at a much higher price than honey which is dark and strong. Some grades of honey are used only for baking purposes.

The quality of the honey from the same plant source varies somewhat, also, ac-



(4-5) Courtesy United Fruit Co.

BANANAS AND PEACE

Subtropical Honduras occupies a coastal plain and mountain region tempered by Caribbean breezes; a climate perfect for bananas, which are grown in enormous quantities. (1) Presidential Palace. (2) A bit of Spain in Tegucigalpa. (3) Mayan gargoyle. (4) Rural transport. (5) Señorita.

WHITE BEAUTY OF JUNETIDE

The flowering honey locust is one of our loveliest trees, especially during June. It usually has a formidable array of thorns. The trees may grow seventy feet tall.

cording to soil and climatic conditions of the place where it is grown. Alfalfa honey from Colorado, Idaho, and Utah is light in color and mild in flavor, while alfalfa honey from Southern California is amber in color and rather strong in flavor.

In any locality, there are but a few important plant sources of honey. Honey flowers must be rich in nectar and have a corolla tube shallow enough to permit the bee to reach the nectar.

Alsike clover, white clover, and sweet clover are the chief honey plants in Northeastern United States, Eastern Canada, and British Columbia. In north-central regions, buckwheat yields large quantities of nectar. In the irrigated Rocky Mountain districts, alfalfa is of first importance, while in the black-land belt of the South, cotton yields much nectar for honey.

In Texas, mesquite, huajillo, and catclaw shrubs and trees of the semi-desert produce nectar of fine quality. In Florida most of the honey nectar comes from trees, the palmetto, tupelo, black mangrove, and manchineel being important. Alfalfa, orange blossoms, and sages are source plants of honeys of California.

Many common weeds, such as the dandelion, smartweed, boneset, and goldenrod, contribute to the wealth of the hive, as do the flowering trees and shrubs like the basswood, apple, and wild plum. Each gives the nectar its own distinctive flavor, creates its individual market, or helps support the colony of bees through the round of the seasons. See BEE.

HONEY LOCUST, SWEET LOCUST, or BLACK LOCUST. The beautiful honey locust tree is a true native of the United States. Closely resembling the acacia, honey locusts have long leaves divided into small leaflets of a rather bright green, which gives the trees a light coloring. The flowers are greenish, and the large, brown seeds develop in long, sometimes twisted pods containing a sweetish pulp. The tree is protected by long, heavy thorns, and for this reason is much used for hedges. Honey locusts reach a height of seventy feet and more.

HONEYSUCKLE, *hun'i suk'l.* The flowers containing the sweet nectar of the red and orange honeysuckle are favorite haunts of the lovely humming birds, who delve into the blossoms for the sweet. But that is not the only honeysuckle. Another variety of this twining shrub bears yellow blossoms which attract the bees, and still another has the familiar trumpet flowers which make it a favorite with vine growers. Most honeysuckles are evergreen and, when

Above, courtesy Cunard-White Star, Ltd.
Left, courtesy Canadian Pacific Lines

BRITAIN'S STRONGHOLD IN CHINA

Military key to British commercial activity in China is Hong Kong, a fortified island off the southeast coast. Above, an air view. Left, Victoria street scene.

winter comes, exchange their blossoms for tiny red flowers which brave the cold season.

HONG KONG. Separated from the southeast coast of the mainland of China by a narrow strait, Hong Kong is a rugged little island that has come to be one of the most important commercial and shipping centers of the West Pacific Ocean. To the magnificent harbor of the beautiful city of Victoria, built on the northern slopes of the island, come thousands of vessels from all over the world.

Hong Kong, an important naval base, is a colony of Great Britain. The island proper has an area of about thirty-two square miles, but the colony of Hong Kong also includes the peninsula of Kowloon and certain other territory leased in 1898 for ninety-nine years, making the total area 391 square miles. The population is about 3,000,000, mostly made up of Chinese. Chief industries include agriculture, fishing, manufacturing, and commerce. There are several large shipbuilding plants, sugar and tin refineries, tobacco factories, and cement plants. Numerous granite quarries are located in the upland regions. The native Chinese produce beautiful carved ivory, glass, gold and silver products, and dyes

Great Britain began to develop Hong

Kong as a trading center early in the nineteenth century. In 1842 the Chinese ceded the island and later leased an extensive section of the mainland to Great Britain. At the same time all nations were given free access to the port. Japan occupied the colony from 1941 to 1945.

HONOLULU, *ho no loo′loo,* HAWAII. With large buildings, schools, telephones, and trolleys similar to those one finds on the mainland, Honolulu, the capital of Hawaii, is a thriving city in which modern innovations blend pleasingly with the colorful atmosphere of the "land of perpetual spring." Located on the island of Oahu, it is called the crossroads of the Pacific, for vessels on their way across the Pacific Ocean stop in its harbor to take on coal and to load and unload cargo. Near by are Pearl Harbor and Waikiki Beach.

Honolulu is an industrial city, with many large factories that prepare Hawaiian products for export. One of the principal industries is the preparation and canning of pineapples. The manufacture of sugar and sugar-mill machinery is also important, and the many ships that come to Honolulu support a large ship-repairing industry. Nearly all the products of the islands are shipped from this port to the mainland.

Honolulu began as a small village, serving first as a center for the native governments. It did not begin to flourish until after the islands became part of the United States. Under American leadership modern hospitals and a public library have been built. At the head of a well-developed school system is the University of Hawaii. The population is about 300,000. See HAWAII.

HOOD, JOHN BELL (1831-1879). Much criticism has been levied against General John Bell Hood, a Confederate leader of the Civil War, for his failure to check Sherman's army in its advance to Atlanta. Hood, in 1864, succeeded General Johnston as commander of the Confederates in the South. He attacked Sherman at Nashville and Franklin and was defeated, and the Union army marched unhindered into Georgia. It was claimed that had he followed Johnston's tactics in retreating and harassing Sherman, much of the damage might have been prevented.

Born in Owingsville, Ky., Hood was graduated from West Point. He resigned from the army at the opening of the Civil War; joined the Confederates, fought at Gettysburg, and lost a leg at Chickamauga. He served under Johnston in an attempt to stem Sherman's march before succeeding him in July, 1864.

HOOD, MOUNT. Rising 11,250 feet out of the Cascade Range in Oregon, majestic Mount Hood affords a marvelous view of the rugged country about it. It is about fifty miles east of Portland.

HOOD, ROBIN. See ROBIN HOOD.

HOOK′ER, JOSEPH (1814-1879). In spite of the humiliation of defeat in the Battle of Chancellorsville, the Civil War general, Joseph Hooker, rallied heroically and distinguished himself in the Battle of Chattanooga.

He was born at Hadley, Mass., and was educated at West Point. He served with distinction in the Mexican War, was appointed brigadier general of volunteers in 1861, and later commanded the Army of the Potomac. Though Hooker showed great talent for organization, he was not successful in command of large forces, and in May 1863, occurred the disastrous rout at Chancellorsville. At Chattanooga, Hooker was under Rosecrans, and led in the mountain attack. This victory won him the rank of major general. During the last years of the war, Hooker served under Sherman in the Atlanta campaign. See CIVIL WAR IN AMERICA.

HOOK′WORM. If one travels through the Southern states, he is very apt to find hundreds of people afflicted with a strange malady known as *hookworm disease,* or *hookworm anemia.* A vicious little parasite, the hookworm is from one-fourth to one-half inch in length and has three pairs of sturdy curved teeth. It enters the body through the skin (usually the bare feet of children) or through the mouth, and passes through the bloodstream to the lungs. When coughed up and swallowed, it finds its way to the small intestines, where it fastens itself to the lining. Here it develops, lays its eggs, sucks the blood, and forms a poison which is scattered throughout the body.

The chief characteristics of the disease are pallor caused by the anemia, weakness, and stunted growth. Hookworm disease is readily cured by treatment with certain drugs, which should be prescribed by a physician. Prevention may be brought about by the wearing of shoes, greater cleanliness, and proper disposal of waste matters to prevent pollution of the soil.

The Rockefeller hookworm commission has spent thousands of dollars in fighting the disease; by its efforts, thousands of sufferers have been restored to a healthy, normal condition.

HOOVER, Herbert Clark (1874-). Some statesmen achieve fame through powers of oratory; others by sheer forceful personality. It cannot be said that Herbert Hoover, thirty-first President of the United States, excelled in either of these traits. He excelled as an executive. An executive is one who supervises and sees that all duties and regulations assigned to him are carried out with care and precision. Herbert Hoover's long and varied experience in business management, as a mining engineer, head of a mining-engineering firm, administrator of Belgian Relief, and head of the United States Food Administration during World War I, prepared him well for the office of Chief Executive of the United States. However, he was a victim of circumstances for the most part beyond his control, a victim of the times and of the economic cycle which brought to his administration the worst depression in the nation's history.

HERBERT CLARK HOOVER
Thirty-first President of the United States
Administration: 1929-1933
Highly successful mining engineer, hero of Belgian war relief, and long-time Secretary of Commerce, Republican Herbert Hoover was a thorough and efficient executive.

The Start of His Career. Born of Quaker parents in West Branch, Iowa, August 10, 1874, young Hoover was left an orphan at an early age and went to live with an uncle in Oregon, where his elementary schooling was acquired. In 1891 he entered Leland Stanford University, graduating four years later with a degree in mining engineering. Beginning work in the California mining area, within two years the young engineer was sent to survey a mining enterprise in Australia, becoming its manager in 1898. The following year he accepted the post of chief mining engineer of the Chinese government.

Hoover married Miss Lou Henry, whom he had known at Stanford University, and with his wife arrived in the Orient in time to witness the Boxer Rebellion. It was there that Hoover's first experience in relief work was acquired. Then for eleven years, until 1914, he traveled to all parts of the world as head of a mining-engineering firm in London.

Directing Belgian Relief. Shortly after the outbreak of World War I, a request by the American ambassador in London led Hoover to give up his profession in order to organize food relief for the Belgians. The German invasion had cut off the food supply of these people, and hunger and privation had seized their small country. During three years he accomplished the tremendous task of acquiring from the United States, Great Britain, and France, food supplies for distribution to the Belgians.

When the United States joined the overseas conflict, it became apparent that it would be difficult to feed the population at home and those in the trenches. In 1917 Hoover was summoned home to head the Food Administration. His commendable record and first-hand knowledge of world affairs made him a logical candidate for Secretary of Commerce in the Harding Cabinet. The department was well managed and served as a model for other Cabinet offices, and his reappointment in the administration of Calvin Coolidge followed as a matter of course.

Election and Administration. In a campaign marked by tariff arguments and the wet and dry issues, overshadowed by the factor of religious prejudice, Hoover defeated his rival, Alfred E. Smith, by a majority of more than 6,000,000 votes (444 to 87 in the electoral count).

The new President summoned a special session of Congress after his inauguration in 1929, for the purpose of discussing the tariff and farm problems. The Federal Farm Board was set up under a new farm-relief measure, and a tariff bill, now famous as the Smoot-Hawley Act, erecting one of the highest tariff walls in the nation's history, was introduced but not passed until June, 1930 (see FARM RELIEF).

The Depression of 1929. In October, 1929, the top-heavy speculative structure of the economic world toppled so rapidly that unemployment and human want seemed instantaneous. Many causes, direct and indirect, have been discussed in an effort to explain this sudden turn in the economic cycle. Most economists agree that World War I had a direct bearing on the depression. Following the war, an abnormal market was created to satisfy the demands of reconstructing nations, and loans were advanced to them by creditor nations (United States and Great Britain). But as soon as the reconstructing nations ceased to be buyers and became producers, in their own right, tariffs were erected against them by the almost self-sufficient creditor nations. The buyer stopped buying until he could get money by selling his own products, but high tariffs prevented the sale of his goods.

Increased production led to an increase in inventions and improved means of manufacturing, gradually eliminating men and increasing what is known as *technological unemployment.* Wages were, however, at a high level, and workers, believing they would continue so, bought heavily, made the time-payment plan popular, and mortgaged their future incomes.

The quick profits realized during the first years following the war led people to invest heavily, expecting quick and fabulous returns. Banks loaned money on insecure collateral and credit money was greatly expanded.

It seemed inevitable that this bubble of circumstantial prosperity would eventually burst, a point would be reached when buyer and seller could not co-operate, and creditor nations would find themselves unable to collect loans; when factories would stop producing, and men would be unemployed; when people would demand money of their bankers; bankers would demand money of their debtors, and people would be unable to meet their mortgages and time payments; and when world economic life would be bound in ropes knotted with unsound business practices, knots which would take years to untie.

In many countries, despair and frenzy seized control of the people, revolutions occurred, and dictatorships arose. In America, Herbert Hoover found the nation unprepared to meet a crisis.

Efforts to Check the Depression. The President, a conservative and a staunch individualist at heart, was forced to decide the question of how much a government should do in providing for the common welfare. Finally, he urged Congress to increase farm relief and to provide large amounts of money for public work to create employment. He asked revision of the immigration laws and sought co-operation between governmental agencies and outside groups to prevent the hoarding of money and to keep wages as high as possible. Hoping that a moratorium, or extension, on foreign debts would encourage world recovery, President Hoover advanced a plan for suspension of all reparation payments by Germany and of debt payments by other nations for a period of one year. This move was approved by all the affected nations and by Congress.

After much deliberation, the Reconstruction Finance Corporation was established for advancing loans to private business. Observers point to this and to the Home Loan Bank Bill which followed as the beginning of a new era in American government. Later these ideas were incorporated into the "New Deal" under Franklin D. Roosevelt. The additional burdens now assumed by the government caused the passage of a new general revenue bill, providing, in the main, for an increase in income taxes and new taxes on luxuries.

Other Events. The Twentieth Amendment to the Constitution was passed, changing Presidential inauguration day to January 20 instead of March 4 and eliminating the short session of Congress on election years. Congress approved a program over the President's veto providing for the independence of the Philippine Islands.

In looking over the Hoover administration, one will find an outstanding array of department heads and officials. It was marked by the appointment of various commissions for the study of specific national problems, social and economic—truly a new era in American government. Among them was the scholarly survey of social welfare in America under the name of *Recent Social Trends,* which provided much background for legislation. Noteworthy, also, were the White House Conference on Child Welfare and the commissions on National Law Enforcement and on the cost of medical care.

In 1932, Herbert Hoover was defeated in the Presidential election by Franklin D. Roosevelt, the Democratic candidate. After the election, Hoover returned to his home in California. He continued to take an active interest in political and civic affairs, and occasionally spoke on the public platform and over radio.

In 1945, Hoover became honorary chairman of the Famine Emergency Committee, and in 1946 and 1947 headed several food investigations abroad. In 1947 he was appointed head of a commission to study means of simplifying the operations of the Federal government; he announced that this would be his "last public service."

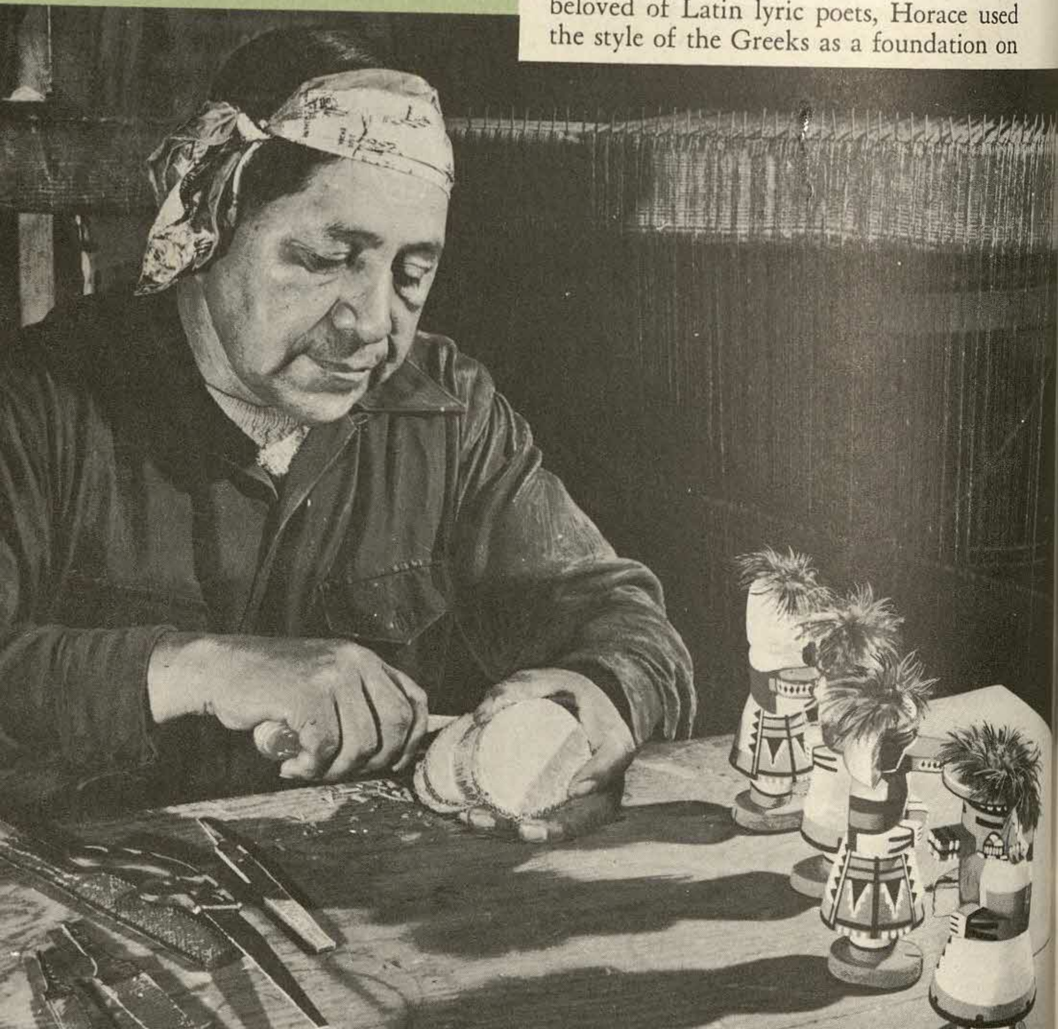
HOOVER DAM. Built in the Colorado River at Black Canyon, Hoover Dam is the highest in the world. It was formerly called Boulder Dam. See IRRIGATION; BOULDER DAM.

GOOD CHEER ON THE VINE
Hops are the dried flowers which give the characteristic bitter flavor to beer.

HOP. The bitter flavor in beer is produced by hops, which are the dry flowers of the hop plant. This member of the nettle family is cultivated in parts of Europe and America for the brewing industry, which uses it in large quantities. Formerly it was used in the preparation of homemade yeast. The vines are started usually from cuttings and are trained up poles from fourteen to eighteen feet long and set in the ground. On the Pacific coast, wire trellises are employed. When the hops are ripe, the poles are taken down and the flowers stripped off. These are dried and pressed into bales, in which form they will keep indefinitely. American hops are grown commercially in New York and the Pacific-coast states, although the plant is found throughout the Northern and Eastern states. See BREWING.

HOPI, *ho'pe,* **or MOKI,** *mo'ke.* Visitors to Northern Arizona frequently are amazed at the beauty and workmanship of the pottery and baskets seen in the villages of that state. These articles are usually the work of the Hopi Indians, an industrious people who once dominated the entire region. Numbering about 3,500, the Hopi live in cliff dwellings called *pueblos* and have always been successful farmers. One of the interesting sights tourists may see in the Hopi villages is the famed snake dance, performed by Indian dancers holding live snakes in their mouths. See PUEBLO.

HORACE, *hor'ase* (QUINTUS HORATIUS FLACCUS) (65-8 B.C.). Greatest and most beloved of Latin lyric poets, Horace used the style of the Greeks as a foundation on



Santa Fe Railway

DOLLS FOR THE TOURISTS

Iopi craftsman practicing an ancient folk art —
ing Kachina dolls. Kachinas are spirits that play
an important part in Hopi religion.

"HOW WELL HORATIUS KEPT THE BRIDGE"
In the days before Rome grew great, the city was once attacked by an Etruscan army. Horatius and two companions held it at bay while a narrow bridge approach was cut.

which to build verse of appeal and exquisite beauty, which are not lost, even in translation. Born in Venusia, Southern Italy, Horace was taken by his family to Rome when he was twelve. The next six years were spent in securing a fine education, later supplemented by a sojourn in Athens. While at Athens, he fought in the defeated army of Brutus; but when an amnesty was declared, he returned to Rome and seriously began the writing of poetry.

Horace became the friend of Vergil and of various other Roman writers. Through them, he met Maecenas, friend of Caesar Augustus and a patron of art and literature. Maecenas became attached to Horace, offered considerable encouragement, and after a time gave him a small estate in the Sabine Mountains. In the course of several years, Horace acquired two other small homes, including one at Rome.

The poems of Horace are contained in four books of *Odes* and a book of *Epodes*. His *Satires,* included in two books, and the two books of *Epistles* are among the finest examples of exposition, combining strength and originality, humor and pathos, merriment and sadness.

HORATIUS, *ho ra'shi us*. Once upon a time Rome was saved from the Etruscan army by the bravery of Horatius, according to an ancient legend. In Macaulay's *Lays of Ancient Rome,* the story is told in stirring verse. As the enemy forces were advancing along a road to Rome, Horatius and two companions challenged their leaders to individual combat. Then, while they fought, the Romans destroyed the bridge over the Tiber River. Just as the bridge began to fall, Horatius bade his two companions flee, while he remained behind. He was wounded, but saved himself by swimming across the river.

HORE'HOUND. Formerly a popular condiment, this perennial herb of the mint family is now cultivated almost entirely for use in candies or syrups intended to relieve coughs and colds. It is aromatic and has a bitter taste. Candied horehound is made by boiling sugar with a brew of the leaves and stems. The nectar of the flowers, loved by bees, is the source of an agreeable honey which at one time sold in drug stores.

The plant is native to the Mediterranean regions, but now grows wild in temperate regions all over the world. European settlers established it in gardens in North America, whence it escaped to roadsides and waste places. Its name refers to its *hoary* appearance, the toothed, grayish-green leaves being covered with down.

HOR'MONES. Among the many important materials to be found in the blood are the hormones, whose chief functions are to stimulate and co-ordinate the various organs and tissues of the body. These substances are formed in the ductless glands. The hormones enter directly into the bloodstream from the glands. The name comes from a Greek word meaning *to excite.* See GLANDS.

HORN. Occasionally we see, in some farmhouse, the horn of an ox or a ram which has been hollowed out and at some time has served to call the workers in from the fields. It was from just such a horn as this that we took our name for all sorts of noise-making instruments, from that which warns us of a coming automobile to those which are played in the band and the orchestra.

Musical Horns. In a general way, the name applies to any musical instrument with a conical, or tapering, interior. Musicians, however, like to distinguish between trumpets and horns, and when they speak of *the horn,* they mean the instrument also known as the *French horn.*

The French horn is a direct development of the medieval hunting horn. In its present form it is a tube sometimes nearly twenty feet long (but twisted in circles so that it is easily carried), equipped with three pistons which alter the notes produced by changing the length of the tube. The pistons have been in use a little over a hundred years.

Before 1820 the *natural,* or *hand,* horn was used. With this horn the notes of a scale could be produced only by the insertion of the player's fingers or hand into the flaring end. When the French horn was first introduced into the orchestra, about two centuries ago, people objected that it was noisy. Now it is considered one of the most beautifully toned instruments when skillfully played.

HORN. All horns are made of tough, flexible, and partially transparent materials that grow as an extension of the outer skin, or *epidermis.* The hoof crusts of cattle, sheep, and horses are of the same material.

The only horn-bearing animals are members of the many families of *ungulates,* an order of hoofed quadrupeds. Cattle, sheep, goats, and the true antelope grow their horns in pairs. The rhinoceros usually has but one, which is located in the middle of his head, while the deer has horns that branch out like a tree, and which he sheds every year.

The horns of cows, sheep, and goats consist of a bony core surrounded and protected by a horny substance, which is an extension of the connective tissue of the skin. Cattle horn is usually yellowish, fine, and neatly curved.

Horn is easily worked, and today is made into a variety of articles, including buttons, combs, hairpins, paper knives, and handles for umbrellas, knives and forks. Parings of hoofs are used in making glue.

HORNBEAM, *horn'beem.* In the woodlands of Southeastern North America may be found two trees of the birch family whose leaves look like birch leaves in many respects. These two small trees have exceptionally tough wood but they differ in the appearance of the bark. One of them has close-fitting bark which is very smooth and clings to the longitudinally ridged trunk of the tree. This is the *American hornbeam, blue beech,* or *water beech.* The other tree has roughly frayed bark and is the *hop hornbeam,* or *ironwood.*

The hop hornbeam gets its name from the similarity in the appearance of the fruit cluster to that of the hop. In this case the nutlets are enclosed in a number of paper-like sacs. On the other hand, the fruits of the American hornbeam lie exposed, but are attached in clusters to fanlike leaf structures shaped much like arrowheads.

The trees are rather popular as ornamentals, particularly the American hornbeam, which often grows into grotesque shapes. They are, however, rather slow-growing plants, and where a quick effect is desired are not suitable. The wood of the American hornbeam is very difficult to work and so has but limited uses. That of the hop hornbeam is used particularly for tool handles, levers, and such implements.

HORN'BILL. The name of this odd-looking bird comes from hornlike projections at the base of the enormous bill. There are several species, native to Southeastern Asia and Africa. Hornbills are awkward, ungainly birds about five feet in length. The beak is about a foot long, though usually very light. The birds are slow in flight and extraordinarily stupid. Their food consists of small reptiles, insects, and soft fruits. The birds nest in hollow trees; and when the eggs are laid, the male plugs the hole with mud, leaving the female imprisoned until the eggs are hatched. He feeds her, however, through a small opening.

HORNED TOAD. Covered with sharp, hornlike "stickers," from which it gets its name, the horned toad is a harmless lizard-like animal native to tropical America. It feeds on insects and makes its home in dry places. There are seventeen species, some of which are called the *California toad* and the *horned lizard*.

QUEER BIRD
This extraordinary denizen of tropic forests is the rhinoceros hornbill, a unique species.

HORNET. A particularly vicious and painful sting is one of the first things people associate with this species of wasp. Hornets are related to the yellow jackets and the wasps which make flat papery nests about houses. The hornet is a social insect with habits very similar to those of the bumblebee. Only the females live through the winter. In the spring they come out of their hiding places in holes in the ground under stones and logs, and make a start at nest building. They lay eggs which hatch into workers, tend the larvae until they emerge, and then turn the work of nest building over to the workers. The queens, or old females, lose their wings at this time and remain in the nests laying eggs for the rest of the season. Later in the season new queens and males are produced. See WASP.

ARMED FLIER
Hornets have the most vicious of insect stings; do not hesitate to use them. The insects build interesting nests of paper made from old wood.

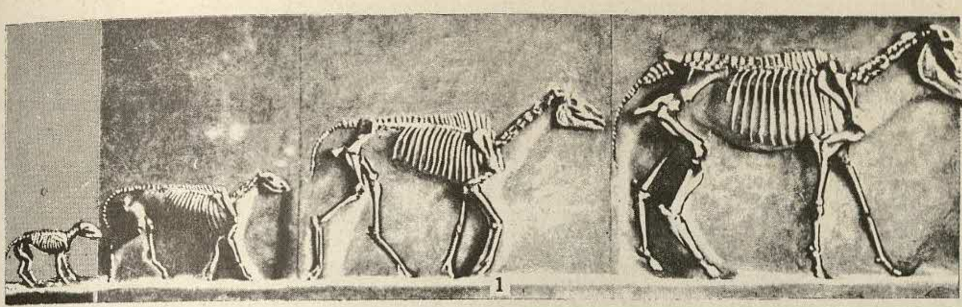
Australian News & Information Bureau

HORSE. No one knows when the horse was first domesticated. Originally, in the Far East, he was tamed, then was taken to Europe, and eventually was carried to America by the Spanish explorers following Columbus. Some of the horses escaped and roamed the Western prairies in wild bands. These, captured in large numbers by roving tribes of Indians, became an important part of the red man's life. Bands of wild horses still range the Western lands and are sometimes caught and tamed as "bronchos" by the cowboys, but the breeding stocks of farm and race horses have been chiefly imported from Europe and Arabia. See EVOLUTION.

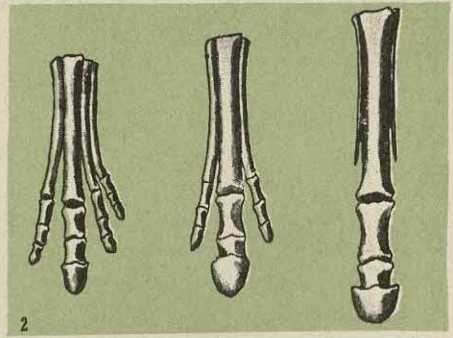
Description and Characteristics. The horse belongs to the same family as the zebra and the ass. He is one of our most beautiful animals, with a long flowing mane and tail, beautifully arched neck, a sleek, graceful body, and long, sturdy legs. His hoofs are single and unparted, each being in fact, a single toe; his coat is of short, soft hair, and his color is varied, though usually of a single shade.

Like people, horses have a temporary set of teeth, followed by a permanent set. The temporary set consists of twenty-four teeth; the number in the permanent set varies from forty to forty-four. A horse's stomach holds but three or four gallons, compared to the thirty- or forty-gallon stomach capacity of the ox. Since horses do not breathe through their mouths, they have wide, flaring nostrils.

These animals have a sensitive nervous system, and their senses of hearing, smelling, and tasting are exceptionally well developed. Their hearing is so remarkable that loud noises and shouting produce strange reactions and nervousness in their behavior. Their sensitive smell and taste serve to guide them to food and water and to aid them in making a distinction between harmful and harmless objects. But the most unusual thing about the horse's nature is his remarkable memory. If a



HORSES NO BIGGER THAN A DOG . . . were the rule in the Stone Age, and it is only in the course of years that the horse has reached his present size. (1) The stages.



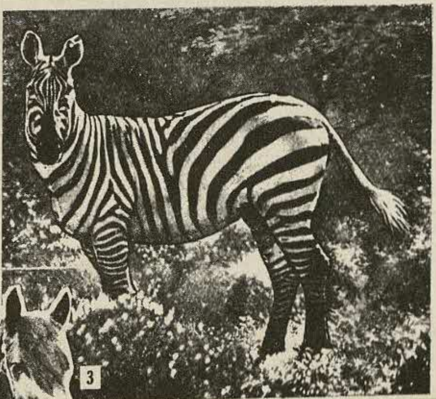
horse, as a colt, succeeds in breaking away, he will be very apt to repeat the performance under like conditions again.

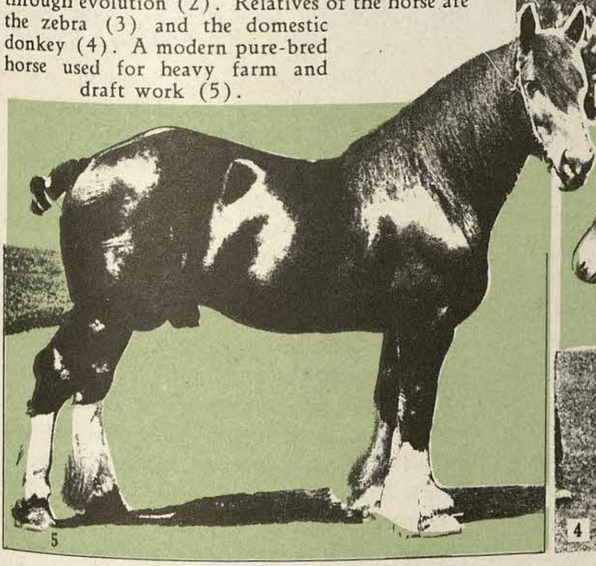
Types of Horses. There are but three general types of horses in use today: the small breeds, usually known as ponies; the heavy draft horses; and the thoroughbreds, which include saddle, race, and harness horses.

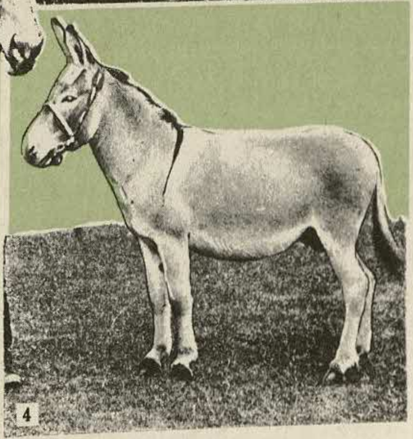
The small breeds are in little demand and are purchased principally for the use of children.

The draft horses are the type generally used on farms and for certain work in the

Horses really stand on their great toes, but these have been greatly modified and strengthened through evolution (2). Relatives of the horse are the zebra (3) and the domestic donkey (4). A modern pure-bred horse used for heavy farm and draft work (5).







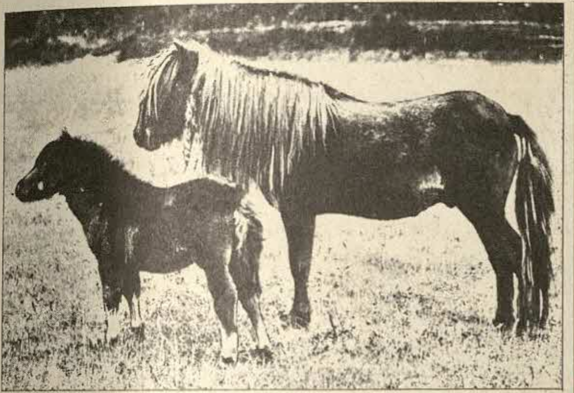
CHAMPIONS AT WORK AND PLAY
Even in these days of tractors and trucks, horses are still widely used as farm work animals (1). Elsewhere, they are used chiefly for riding and other sports. A champion race horse (2). A speedy polo pony (3). A cavalryman jumps a well-trained mount (4).

cities. They are big, rugged, and active, and must be able to draw a heavy load at a brisk pace. Their weight and endurance are remarkable; they are built for a long, constant pull and in no sense are built for speed.

Race horses are merely highly bred saddle horses that are taught to run certain distances in exceptional time. Racing in England and America has reached a high state of development, and a few race horses have been found that can step a mile in one minute and forty seconds.

Harness races, in which the harness horses pace or trot a route, are held all over the United States, particularly at state fairs. Though these races seldom carry the interest of the various derbies, they have a large following among the race enthusiasts of the country.

The Care of Horses. The feeding of horses varies according to the type of work they do. Draft horses are fed considerable energy-forming corn, as well as oats, hay, and bran. Saddle and race horses, on the other hand, live largely on a diet of oats



MOUNTS FOR ALL THE FAMILY
Ponies (above), long favorites with children, are usually docile and friendly. Right, the horse as a hunter: the master of a fox hunt mounted.

and hay, corn seldom being fed them because of its fat-producing tendencies. A horse needs plenty of exercise and, when not working, should be kept on pasture where he may both exercise and graze.

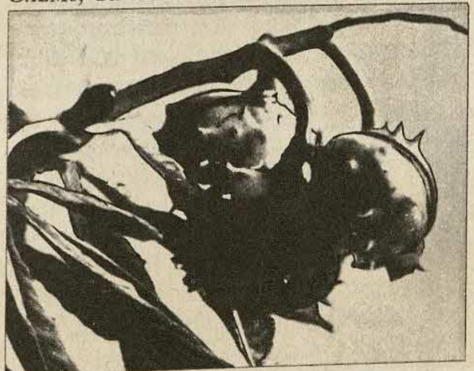
Horses should be watered lightly after coming in from the hot, dusty fields. Not until they have had ample time to cool off, should they be allowed to drink their fill.

The coat of the horse should be frequently combed and brushed. Work horses should be lightly sponged all over after the day's work. Blankets for the horses are not necessary unless there is considerable exposure to the weather.

HORSE-CHESTNUT, *ches'nut.* The glossy, brown "chestnut" familiar to every country boy is the seed of the horse-chestnut, belonging to a large family of trees and shrubs which were first known in Tibet. The trees bear yellow, red, or white flowers and the leaves are fan-shaped, growing on opposite sides of the stem. The trees of the true horse-chestnut grow to sixty or eighty feet in height, but the American species is a little smaller and the wood is not valuable. The tree gets its name from the fact that the nuts have sometimes been used as food for horses.

HORSE'FLY. See GADFLY.

HORSE LATITUDES. Located near the tropics of Cancer and Capricorn, the horse latitudes are areas of calm, avoided whenever possible in the old days of the sailing vessel. They received their name in the days when sailing ships carrying horses had to pass through them. When the ships were becalmed, some of the horses had to be thrown overboard for lack of food. See CALMS, REGIONS OF.



BITTER FRUIT FROM TIBET
Horse-chestnuts are only good for horses.

HORSE'MANSHIP. The usefulness of a horse depends upon his complete obedience. He must place absolute faith in his master, for otherwise he will never be safe to drive, work, or ride. The use of the bit should be the chief means of control, and the whip should never be used except to urge a horse forward or to punish him.

Handling a Horse. Good horsemanship involves communication between horse and master, and the reins and bits are the transmitters. The hands of the rider and the mouth of the steed are of even greater importance, for the touch of hand upon rein must be light, yet firm, and the horse's mouth must be sensitive and responsive. Jerking, pushing, or pulling on the reins is not horsemanship.

Like the rider, the driver should have a firm seat, so that he will not have to rely on the reins for support. The lines should always be held so they can be quickly shifted, providing for a quick change of pace or direction, or preventing any unruly act on the part of the animal.

Riding is an even finer art than driving, since it involves a secure seat as well as trained hands. Certain horses are built for saddle purposes, just as others are best adapted for work. Good saddle horses invariably possess a long, supple neck, long, sloping "riding" shoulders and high withers, extending well back.

The rider should carry his weight slightly forward of perpendicular, shoulders square, elbows at the sides, and hands in front. The stirrups should be adjusted at medium length and the legs should be straight from the knee down, the feet parallel to the horse's side. To mount a horse, the rider stands at the steed's near (left) shoulder. Holding the reins loosely, the rider places his left foot in the stirrup, grasps the animal's mane, or the top of his neck, and swings his right leg clear of the horse's back, settling into the saddle as easily as possible.

The various gaits of the horse and the method of controlling the speed and making changes from one gait to another must be learned by riding. Walk, trot, canter, single-foot, and running walk are the gaits most often used in ordinary riding. See Horse.

HORSE POWER. The common unit for measuring the power of any engine is the horse power (H. P.). The idea of measuring power in this way was originated by James Watt in 1776, when he attempted to compare the power of his steam engine to that of the horse. Watt concluded that the average English draft horse could do about 33,000 foot pounds of work per minute, or 550 foot pounds per second. This was equivalent to the work performed by a horse in raising 330 pounds to a height of 100 feet in a minute. In an accurate test, the frictional loss is measured.

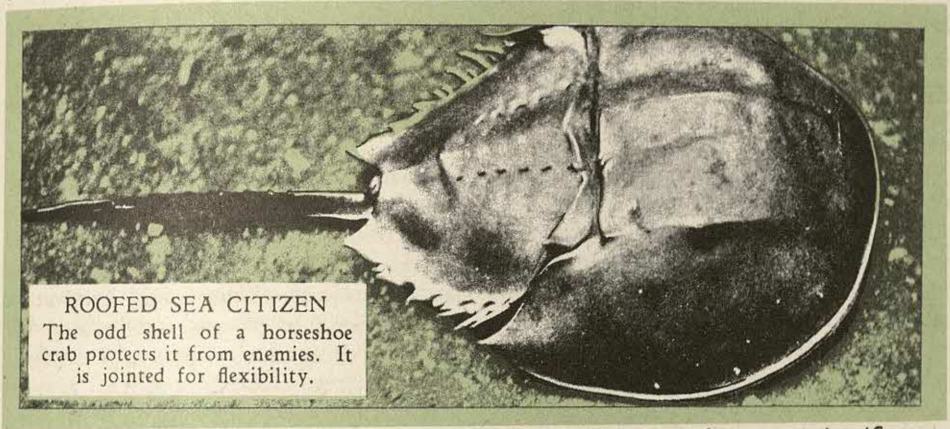
Electrical power is measured in watts, but the kilowatt is more often used because it is more convenient. One kilowatt is equal to 1,000 watts, and one horse power equals approximately 746 watts. A kilowatt is therefore equal to about 1.33 horse power.

HORSE RACING. See Race.

HORSE-RADISH. A vigorous member of the mustard family, the horse-radish is one of those plants that if left alone is apt to become a troublesome weed. Yet it is often cultivated for profit. Though it grows wild, horse-radish is best when cultivated scientifically. First known in Southern Europe, it now flourishes in many parts of the world. Because of its pungent taste and odor, the root of the horse-radish makes an excellent relish when it is ground and mixed with vinegar. It is a favorite with the English as a condiment for roast beef. It is almost universally served with raw oysters; consequently many of the greatest horse-radish areas lie near commercial oyster beds.

HORSE'SHOE CRAB. A horseshoe-shaped native of deep sea waters, this crab is a large crustacean which comes to the surface only during the spawning season. The body is made up of two parts, the oddly shaped shell and a soft back section which ends in a long, spindly tail. Living on shellfish and worms, these crabs burrow into the sand and mud. In this process, the tail is used to push the body forward. The *king crab,* one of the larger species, is found off the northeast coast of the United States and sometimes reaches a length of two feet.

HORTICULTURE, *hawr'ti kul ture.* The raising of fruits, vegetables, and ornamental plants forms a branch of agriculture known as horticulture. Divided into four



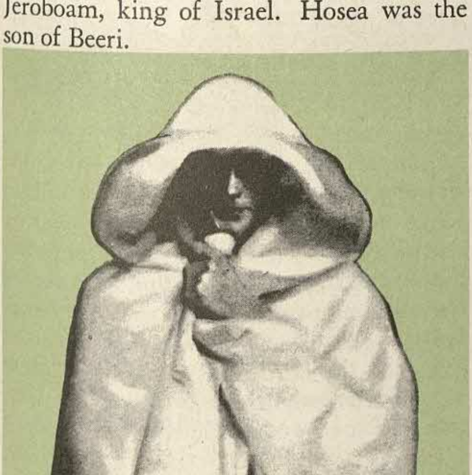
ROOFED SEA CITIZEN
The odd shell of a horseshoe crab protects it from enemies. It is jointed for flexibility.

main classes, horticulture includes the raising of fruits in orchards, truck farming (vegetable growing), the raising of flowers (floriculture), and landscape gardening.

Consult the following titles for further information. See, also, the various articles on flowers, fruits, and vegetables.

Floriculture	Greenhouse
Grafting	Landscape Gardening

HOSEA, *ho ze'ah.* Hosea, one of the minor prophets of Israel, and author of one of the books of the Old Testament, condemned the immorality of the Israelites and their unfaithfulness to Jehovah. He prophesied in the eighth century B. C., during the reigns of Uzziah, Jotham, Ahaz, and Hezekiah, rulers of Judah; and of Jeroboam, king of Israel. Hosea was the son of Beeri.



HERALD OF WRATH
Much of the prophecy of Hosea in the Old Testament warns of Jehovah's displeasure.

HOS'PITAL. Like most scientific materials, good medical equipment is expensive. To give sickness proper attention or to conduct a surgical operation in the home is far too costly for the average family. Modern hospitals are a solution to this problem. Where populations are too small to support a private institution, many public hospitals, supported in part by taxation, are being erected.

Hospital Staff. The staff is generally divided into three groups: doctors and surgeons; nurses; internes. On the staff are specialists in the principal branches of medicine and surgery who are available for immediate call. Sometimes outside practicing physicians devote certain hours to hospital service. Over all, is a doctor called the chief of staff.

Adequate nursing is a prerequisite for a good hospital, and such a hospital employs nurses who are trained in the fundamental knowledge of medicine. They assist the doctor during operations and carry out his instructions in the sick rooms. Many hospitals maintain training schools for nurses, where both theoretical and practical courses are given.

Internes are usually advanced medical students or recently graduated doctors who carry out the routine work of their superiors and receive training that will be of value when they practice independently.

Having the jurisdiction over the physical properties of the hospital is a board of managers, including a superintendent, head nurse, a matron or chief housekeeper, a steward or dietitian for the kitchen, an engineer, and a pharmacist.

Customary Procedure. When a patient enters the hospital, his case history is recorded by an interne who also makes a physical examination of the person. This information is given to a physician who proceeds to make a thorough examination and prepares to care for the case. Certain tests of blood and other body substances and X-ray examinations may first be made. Then the patient is assigned to a room, and if an operation is to be performed, he is made ready for it. Depending on the severity of the operation, a local or complete anesthetic is administered.

In the operating room everything must be arranged with care; instruments must be sterilized and arranged for the convenience of the surgeon; nurses and internes, all sanitarily washed and clothed, must follow out carefully all instructions with almost machine-like precision, instruments passing from hand to hand until the operation is performed.

Kinds of Hospitals. Hospitals are not always of a general nature. Some specialize in certain diseases and treatments. Others, like sanatoriums, treat tuberculosis or other long-time diseases or insanity. There is a need for hospitals to care for contagious diseases, lacking in many communities whose regular hospitals are not equipped for handling such cases. Some business concerns and organizations maintain hospitals or hospital rooms for their ill or injured employees.

LUXURIOUS HOME AWAY FROM HOME

Modern hotels provide every convenience. In service and equipment they are far better than the roadside inn of old. Left, world's largest hotel. Right, "Breakfast, sir!"

HOTEL′. Next to transportation, the problems of where to sleep and where to eat most often concern the traveler when he is away from home. The matter of shelter and food, however, at one time caused more anxious thought than it does today, for a journey had to be so planned that the traveler could reach an inn by nightfall. The modern hotel and the railroad, automobile, and airplane have solved the problem for today's traveler. Improved transportation facilities and increased leisure and means for traveling have caused the erection of fine hotels in all of the larger cities and in many smaller ones.

Unlike the crude Tabard Inn of Chaucer's *Canterbury Tales* or even the Wayside Inn of a much later date, modern hotels are remarkably luxurious. They have rooms enough to accommodate great numbers of people at rates suitable for the average pocketbook. The old inns were primarily for transient trade. Managers of today's hotels have found it profitable to set apart certain rooms for permanent residents.

Hotels are operated on the *European* and on the *American* plans. The former set a price only for the room or suite, leaving the matter of food to the individual; those managed according to the American plan establish one price, including both room and board for the day, week, or longer period.

Large hotels maintain every possible convenience for their patrons—gymnasiums, swimming pools, fine dining rooms, a ballroom with excellent music for dancing, and sometimes transportation to and from depots without cost to patrons.

Management and Regulations. In recent years, several chains of hotels have developed on the principle that fine service can be maintained at lower prices by volume of business under one general management. Some of these hotels have accommodations for more than 5,000 people; as many people can be housed in one building as live in cities the size of Garden City, Kan., or Dover, Del.

Laws affecting common carriers or public places usually apply to hotels. The kitchens, food, elevators, fire-prevention equipment, and the building are subject to inspection as provided in state and local ordinances. No person fulfilling the requirements of respectability and race may be denied a room unless the place is filled. A hotel may not eject a patron without due cause, but the management is privileged to raise the rate of compensation in order to get rid of undesirable guests. Bills are usually collected at the termination of residence, and the hotel has the right to hold the belongings of the guests until payment is made.

HOT'TENTOTS. Living in the western portion of South Africa is a primitive people known as Hottentot. The Hottentots are believed to be a mixture of the Bantu Negro and the Bushman. To others than themselves they appear very homely. Small of stature, they have a yellowish skin, and their faces have very prominent cheek bones, flat noses, thick lips, and sharp chins. Cattle raising and sheep herding are their chief occupations.

At one time the Hottentots roamed over a large territory of perhaps 100,000 square miles, but after the Dutch came to the Cape of Good Hope in the seventeenth century, and other European settlers followed, they were driven back from the coast. In an effort to retain their territory, the Hottentots fought continually against the Boers and Germans. The remaining tribes are now widely scattered. At one time there was a Hottentot population of perhaps 200,000, but war and disease have reduced their number to only a few thousand.

HOUDON, *oo dawn',* JEAN ANTOINE (1741-1828). In art galleries scattered throughout the world are sculptures by the noted French artist, Jean Antoine Houdon. Considered the outstanding French sculptor of his age, Houdon visited the United States in 1785 and executed the famous statue of Washington which is in the capitol at Richmond, Va.

Houdon left Versailles, his birthplace, at thirteen, to study in Paris. After winning the Prize of Rome at the age of twenty, he spent ten years in study there. Later Houdon became an instructor in the Paris School of Fine Arts. Some of his better-known works are busts of Voltaire, Cicero, Napoleon, Franklin, Rousseau, and Molière.

HOUND. The hoarse bay of the hound always brings an eager light to the hunter's eye, because it means that the quarry has been located and the hounds are in fast pursuit. Since he has intelligence and stamina and his keen scent enables him to trail game for long distances, the hound has always been a favored hunting dog. Although the name is frequently given to all hunting dogs, properly speaking only those dogs which hunt by scent are true hounds.

Common among the types of true hounds are the foxhound, the dour bloodhound, the friendly little beagle, and the squat dachshund, each excelling in a particular field. The foxhounds are especially able in scenting out the fox and combine speed with endurance; while the bloodhound is noted for its ability as a trailer. Beagles, because of their small bodies, are useful rabbit hunters; and the dachshund distinguishes himself in ferreting out game which lives in underground burrows.

HOUR GLASS. To solve a perplexing problem—the measurement of the passage of time—early scientists developed the hour glass. This device consisted of two bulbs joined together by a thin tube. Sand, water, or mercury was placed in the top bulb and allowed to trickle slowly into the bottom one. The quantity of the substance was regulated so that the top bulb could be emptied in one hour. Then the hour glass was turned over and the process repeated to measure the next hour. At one time, the hour glass was used to measure the length of religious services. See CLOCK.

HOUSE OF COMMONS. See GREAT BRITAIN.

HOUSE OF LORDS. See GREAT BRITAIN.

HOUSE OF REPRESENTATIVES. See CONGRESS OF THE UNITED STATES.

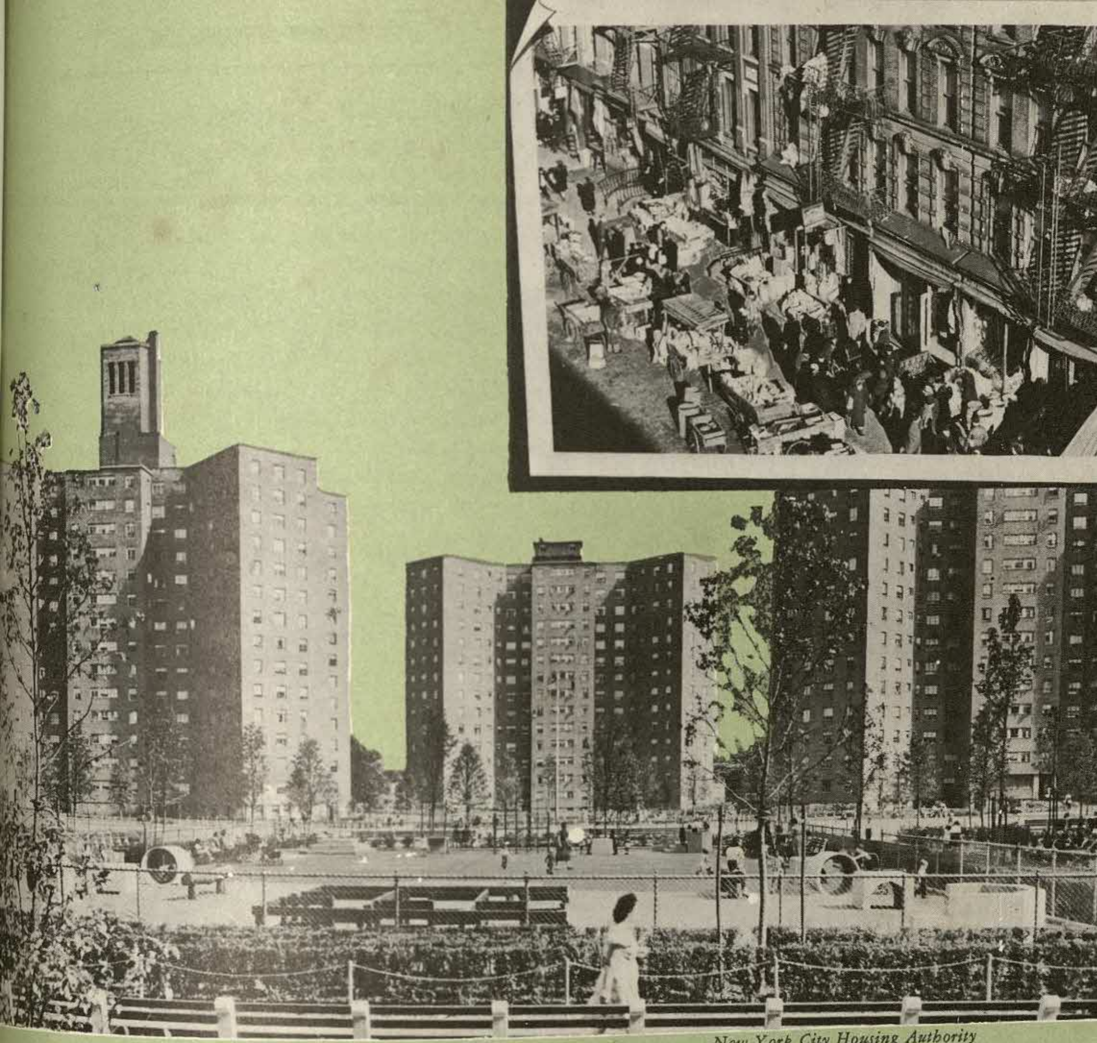
HOUS'ING PROBLEM. Next to food, shelter is the most important consideration in the life of man. Comfort and happiness, to a large extent, depend on where a man spends his waking hours and where he sleeps at night. Unfortunately, under the present social, economic, and industrial system, some people can afford comfortable homes or apartments; others can afford nothing better than hovels, crowded living quarters with poor sanitation and without most of the accepted necessities of life. With the growth of modern welfare agencies and increased social-mindedness, people have come to question the fairness of such an unequal housing system.

Experts have estimated that poor housing costs the United States billions of dollars a year in death, illness, and crime. In cities such as New York and Chicago, a large majority of all criminals come from poor housing areas. This does not mean, of course, that all persons brought up or living in such areas are poor citizens. But living in substandard quarters admittedly is a handicap that some are never able to overcome. Similar and often far worse conditions exist in other nations.

Hovels and Slums. Slums were an inevitable result of the machine age and of the rise and rapid growth of cities. Even today, many large-city dwellers still live in slums, or tenements, having dark, poorly ventilated rooms and inadequate, insanitary plumbing, if any. In such areas rats and vermin are serious problems, and the refuse-littered streets and sidewalks are used for drying clothes and as playgrounds for the children. As all thinking persons realize, such housing and surroundings produce a sordid atmosphere in which to rear children, are a handicap to health, promote crime, rather than good citizenship, and make for misery and unhappiness. In many smaller towns, especially in mining and mill centers, and even on many farms, conditions are as bad or worse.

Early Reforms. As early as 1800, Robert Owen urged Britain to provide better housing for its underprivileged citizens, and in 1851 Parliament passed a law permitting (though not requiring) local governments to build dwellings for their workers. First steps toward providing decent housing at a low rental were taken in France soon afterward, and eventually in other countries and in certain cities. It was not until about 1900, however, that agitation for housing reform really began in the United States, and not until the 1930's that the Federal Government became seriously interested in trying to help provide decent living quarters at rents low-income families could pay.

Meantime, however, various organizations in the United States had been struggling with the problem and recommending badly needed reforms. As early as 1912, the National Conference of Charities, for example, drew up the following list of requirements for modern and adequate housing:



New York City Housing Authority

THE BLACK SIDE AND THE BRIGHT SIDE IN HOUSING

Life is unsafe, unsanitary, and unpleasant in the slum at top. The modern housing project provides safety and sanitation, light and air, and an opportunity for happy living.

"Social welfare demands for every family a safe and sanitary home; healthful surroundings; ample and pure running water inside the house; modern and sanitary toilet conveniences for its exclusive use, located inside the building; adequate sunlight and ventilation; reasonable fire protection; privacy; rooms of sufficient size and number to house decently the members of the family; freedom from dampness; prompt, adequate collection of all waste materials." It can be readily recognized that many homes in America do not meet these standards.

Progress in Housing. The United States, Germany, Italy, Austria, Great Britain, and the Scandinavian countries have recognized the problem. Thousands of unsanitary building have been razed, and in their stead new structures have been erected. In New York's lower East Side—for many years the "black hole" of America, where the lives of men were comparable to those of animals, where young hoodlums and criminals were made, where slums and human filth seemed beyond all remedy—a vast slum-clearance project resulted in the erection of a large, modern, clean, well-ventilated apartment building, covering several city blocks.

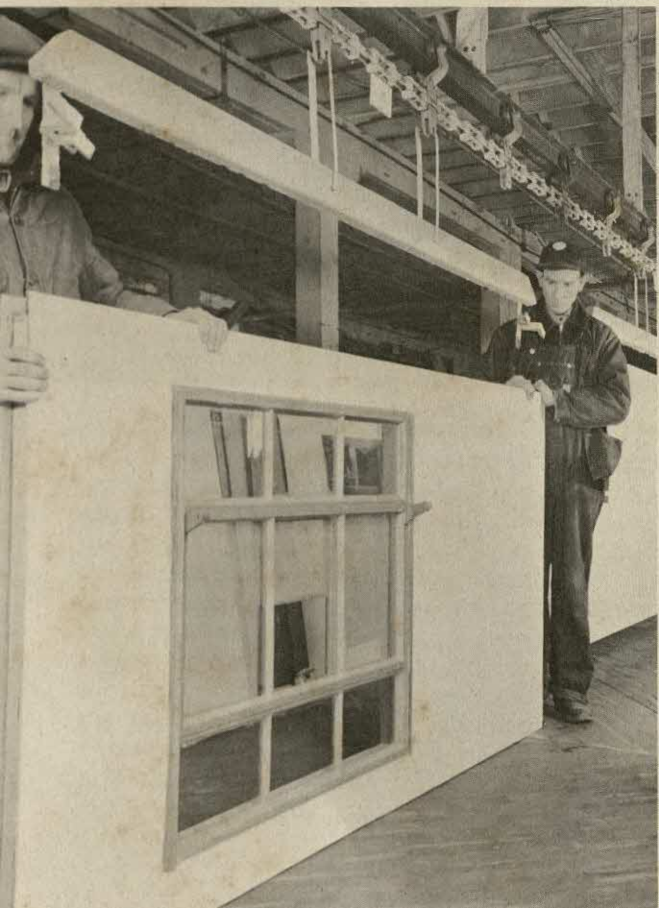
In 1933, the Federal Housing Administration was formed to "construct, reconstruct, alter, and repair" low-cost housing and slum-clearance projects. In 1933, also, the Home Owners' Loan Corporation was established to make available long-term mortgage loans to home owners who could not otherwise refinance their homes.

Home building was halted during World War II. For some time after the war, the shortage of materials slowed home construction; so did the diversion of scarce building materials to industrial, rather than home, building. To correct this situation, the President in 1946 appointed a housing expediter. In 1947, all Federal Housing functions and programs were consolidated in a new Housing and Home Finance Agency.

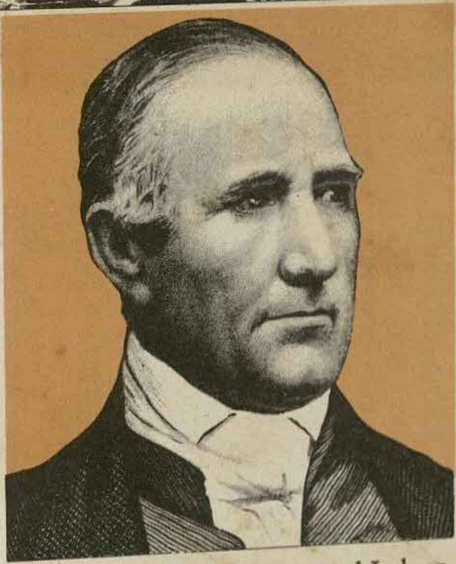
Three Types of Housing Projects. Now underway are three types of reconstruction programs. They include large city apartment buildings, suburban cottage-garden or "green-belt" areas, and rural homes or homesteads, to attract home dwellers and small factories from congested cities to new areas. Under the Federal homestead program, small homes and gardens are made available for little cost, provided the tenant fulfills the residence requirements and develops the property.

INSTANT HOUSING

Modern homes can be quickly erected with prefabricated sections. Inexpensive housing projects rise almost overnight and provide growing families an opportunity to leave the congested areas of large cities.



Gunnison Homes, Inc.



HERO OF THE "LONE STAR STATE"
It took Sam Houston to bring the Mexican, Santa Anna, to his knees and make Texas American (above). Right, the pioneer in later years.

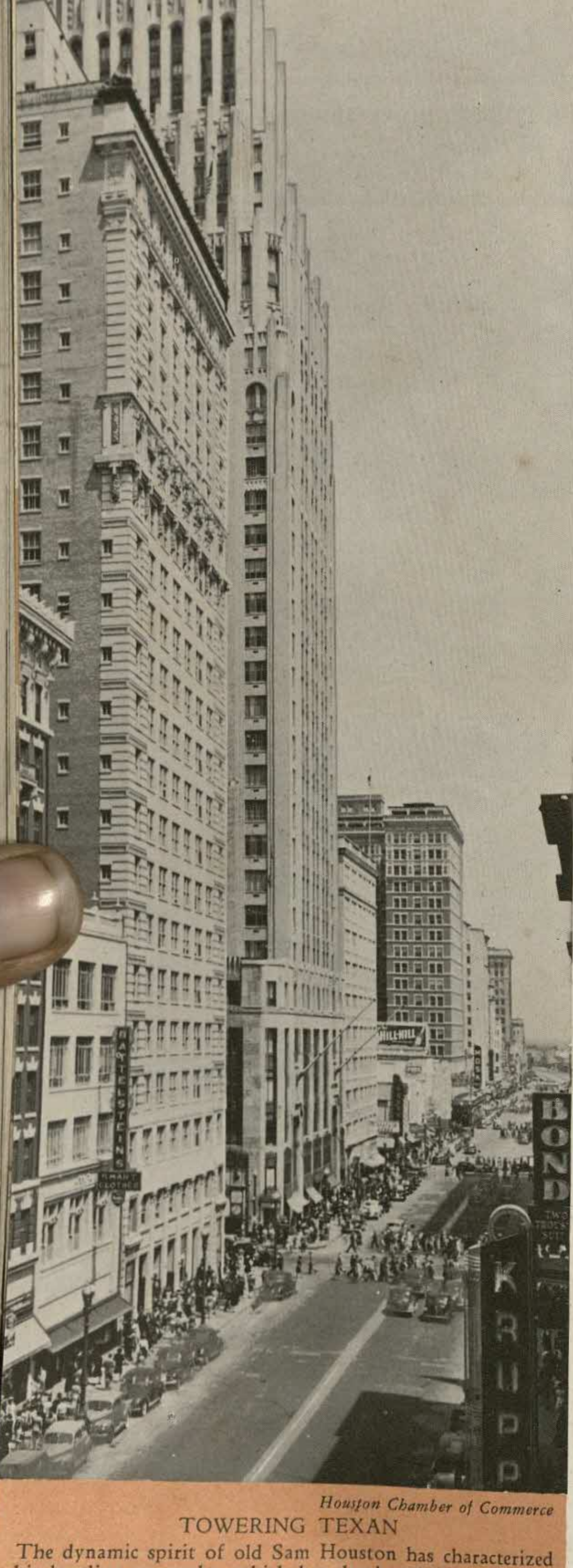
Private enterprises and communities have erected several well-planned towns, but these projects still do not solve the problems of those families to whom the comparatively low rents asked seem relatively high.

Then, there is always the problem presented by the class of socially unfit who, because of their personal laxity and careless habits of living would degrade even the best surroundings. Steps must be taken to prepare these people for the modern community. See FAMILY; IMMIGRATION AND EMIGRATION.

HOUSTON, *hu'stun,* SAM (1793-1863). When Sam Houston led a small army of ragged Texas pioneers to victory in the Battle of San Jacinto in April, 1836, his dream of freeing Texas from the domination of Mexico had at last come true.

Sam Houston was born in Virginia, near the town of Lexington. His family soon moved to the new state of Tennessee, and the boy went to live with Chief Oolooteka of the Cherokee tribe, who adopted him as a son. When he was eighteen years old, Houston left the Indian life and went to live with his family. At the age of twenty he joined the army under General Jackson, who was later to become President of the United States, and helped to put an end to the Indian disturbances in Georgia. Upon leaving the army he took up the study of law, and later represented Tennessee in the Congress of the United States. He also served one term as governor of the state.

He went to Texas in 1832, and in the following year became a member of a convention which met to form a constitution for the state. However, this step led to



Houston Chamber of Commerce

TOWERING TEXAN

The dynamic spirit of old Sam Houston has characterized his bustling namesake, which has developed from a straggling village into an industrial and commercial giant. Here is a scene in downtown Houston

trouble with Mexico, since Texas was Mexican territory before the successful revolt. When Mexico sent an armed force across the Rio Grande under the leadership of Santa Anna, Houston was made commander of the Texan army. With the defeat of Santa Anna, the independence of Texas was confirmed, and a few months later Houston was made President of the new republic.

During two terms as president, Houston worked constantly to bring Texas into the United States. Succeeding in 1845, he was elected to the national Senate, where he served from 1846 until 1859. He was then elected governor of Texas, but was deposed in 1861 because he refused to accept the state's vote of secession during the War between the States. He then retired to his farm at Huntsville, Tex., where he died.

HOUSTON, TEX. Although it lies inland fifty miles from the deep waters of the Gulf of Mexico, Houston is one of the United States' greatest ports. Its ship channel, made from a natural Gulf inlet, Buffalo Bayou, brings the world's largest freighters to its bustling wharves. The Intercoastal Canal also connects it with the other Gulf ports, and the city is an important rail and airlines hub, as well.

Houston is the leading distributor of the agricultural, livestock, and mineral products of Texas and her neighbors, ranking as the world's greatest cotton market and port. Among the many other products it ships are beef, citrus fruits, rice, sugar, cottonseed oil, and sulphur. It is best known, however, for its huge oil refineries and petrochemical plants, and as the world's largest manufacturer of oil-well machinery. Its other important industrial products include flour, steel, paper, textiles, cement, and lumber.

Houston has many fine parks and recreational facilities, residences, schools, churches, and a Museum of Fine Arts. It is the home of Rice Institute, the University of Houston, Baylor University College of Medicine, the University of Texas Dental College, Texas Southern University, Houston College for Negroes, and the Texas Medical Center.

Founded by John K. and Augustus C. Allen in 1836, soon after Texas won her freedom, the settlement was named for Sam Houston (see HOUSTON, SAM). An early capital of Texas, Houston is now the seat of Harris County and the South's largest city. Population, over 940,000.

HOWE, ELIAS (1819-1867). With the invention of the sewing machine, Elias Howe made a revolutionary change in home methods of sewing. He was born and educated in Spencer, Mass. It was while he was working in a Lowell, Mass., factory where cotton machinery was manufactured that he conceived the idea for the machine. He built his first model in 1845 and patented it a year later.

Meeting with scant success in marketing his invention, Howe took it to England, where his reception was also discouraging. Returning to the United States, he found that manufacturers had been making and selling machines without paying him any royalties. By means of lawsuits Howe established his rights in 1854. He accumulated a large fortune before his death.

HOWE, JULIA WARD (1819-1910). Julia Ward Howe, American philanthropist and author of the stirring *Battle Hymn of the Republic,* spent a lifetime in service to others. In 1851, she and her husband, Dr. Samuel G. Howe, director of the Perkins Institution for the Blind in Boston, founded the *Commonwealth,* which became one of the leading papers of the anti-slavery movement. After the Civil War, Mrs. Howe worked for woman suffrage and advocated many social reforms, especially in prisons.

Mrs. Howe, born of a family of means in New York City, received an excellent education. After her marriage, she settled in Boston. Among her writings are a book of poems, *From Sunset Ridge,* her *Reminiscences,* and *Margaret Fuller.* Her daughter, Mrs. Laura E. Richards, won fame as the author of *Captain January* and other beloved children's stories.

REFORMER, POET

Julia Ward Howe, whose *Battle Hymn of the Republic* is one of the great patriotic songs.

HOWE, WILLIAM, Sir (1729-1814). Sir William Howe, a member of the British Parliament, had been opposed to England's policy in America at the opening of the war. However, as an officer and a loyal subject of the king, he took a command in the English army in America and later fought at Bunker Hill. Succeeding Gage as commander in chief of the army, Howe captured New York City and much of New Jersey, and after the Battle of Brandywine entered Philadelphia in 1777. Criticized for not bringing the war to a close, he resigned his command in the fall of 1777, but was not relieved until the spring of 1778. Howe had earlier served successfully in the French and Indian War.

HOW'ELLS, WILLIAM DEAN (1837-1920). Because he believed that novels should portray everyday people and situations rather than fanciful characters, William Dean Howells, American author, paved the way for the realistic novel of today. Writing in a clear, simple style, the author has been praised for the convincing force and reality of his characterizations. He also wrote several comedies. His long list of novels includes *The Rise of Silas Lapham, A Modern Instance, The Minister's Charge, A Foregone Conclusion, A Hazard of New Fortunes,* and *A World of Chance.*

Howells spent many years in an editorial capacity on several of the leading magazines of the day. He began his career writing for the *Ohio State Journal* and other journals, including *The Atlantic Monthly,* of which he was made editor in 1871.

Born at Martin's Ferry, Ohio, Howells worked as a compositor in Columbus, where he first began to write. In 1861 he went abroad as American consul to Venice, where he spent four years.

HOW'ITZER. Until the Germans destroyed the fortifications at Liege in the early days of World War I, the howitzer appeared ready to join the crossbow and the musket as an antique of war. But so successful was it in battle that it was employed by Allies and Germans throughout that conflict and in World War II. It has become the most destructive of all cannon.

Short and rather snub-nosed, the howitzer can fire at an angle of forty-five degrees, permitting shells of high destructive power to drop on buildings, trenches, or fortifications with terrific power. The largest howitzer fires a shell seventeen inches in diameter and 2,000 pounds in weight. The howitzer is an old form of cannon, being used as early as the fifteenth century. Previous to the Second World War, it was thought that smaller guns would prove more effective.

HUB'BARD, Elbert (1856-1915). Best known as the author of *A Message to Garcia,* an inspiring essay of courage and determination, Elbert Hubbard was a distinguished maker of beautifully bound books and the editor of philosophical and literary journals. His famous *Philistine* was widely known for its many frank comments on questions of the day, and *The Fra* was a journal of discussion and criticism.

Hubbard was born in Bloomington, Ill. In 1895, in East Aurora, N. Y., he founded the Roycroft Shops, devoted to work in the handicrafts and bookbinding. Among his essays is a series of *Little Journeys,* describing the homes of famous literary and artistic figures. He lost his life on the *Lusitania.*

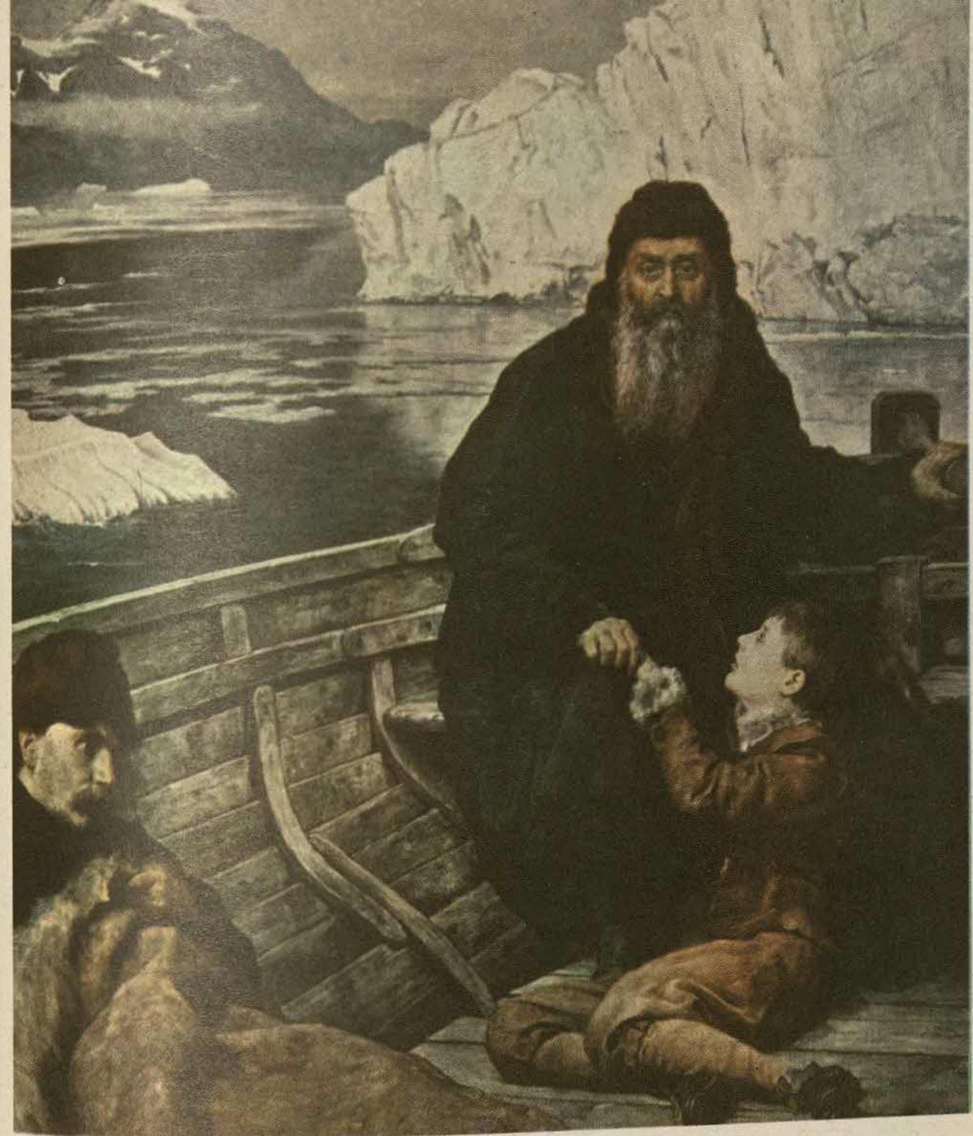
HUCKLEBERRY, or WHORTLEBERRY. In the Southern states and Middle West, huckleberries are not ordinarily distinguished from blueberries. In New England, however, a clear distinction is made. The fruit of the huckleberry contains ten seeds with stony coverings like small peach pits, which crackle between the teeth when eaten. Blueberries have numerous seeds, which are so minute that they are not noticeable when the berries are eaten.

The blueberries or huckleberries which grow wild in Northern and Eastern United States and in Canada are gathered each year, and a considerable quantity reaches local and larger markets of the East and North. The blue- to black-colored fruits, many with a silvery bloom, are excellent for making pies and tarts. The fruit is also canned.

Huckleberries and blueberries both belong to the heath family, but each berry belongs to a different genus.

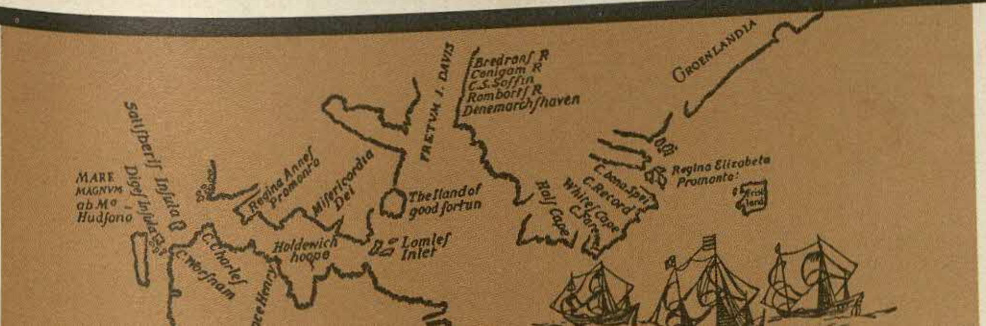
HUD'SON, Henry (?-1611). The daring English navigator, Henry Hudson, had twice tried to find a route to Asia by sailing east through the Arctic Ocean. Then, in 1609 and 1610, he made two voyages to the west in search of a water route to the Orient, discovering the Hudson River in North America on the first voyage in the *Half Moon.* A year later, in the *Discovery,* he discovered and explored the great bay which bears his name, and spent the winter there. Finally, his crew became bitter because of the hardships, and cast Hudson, his son John, and seven loyal members of the crew adrift in an open boat in Hudson Bay. The little party was never heard from again.

HUDSON BAY. Lying in the desolate plains region of Eastern Canada, Hudson Bay is a great inland sea, nearly 600 miles



THE TRAGIC END OF A HEROIC ADVENTURER

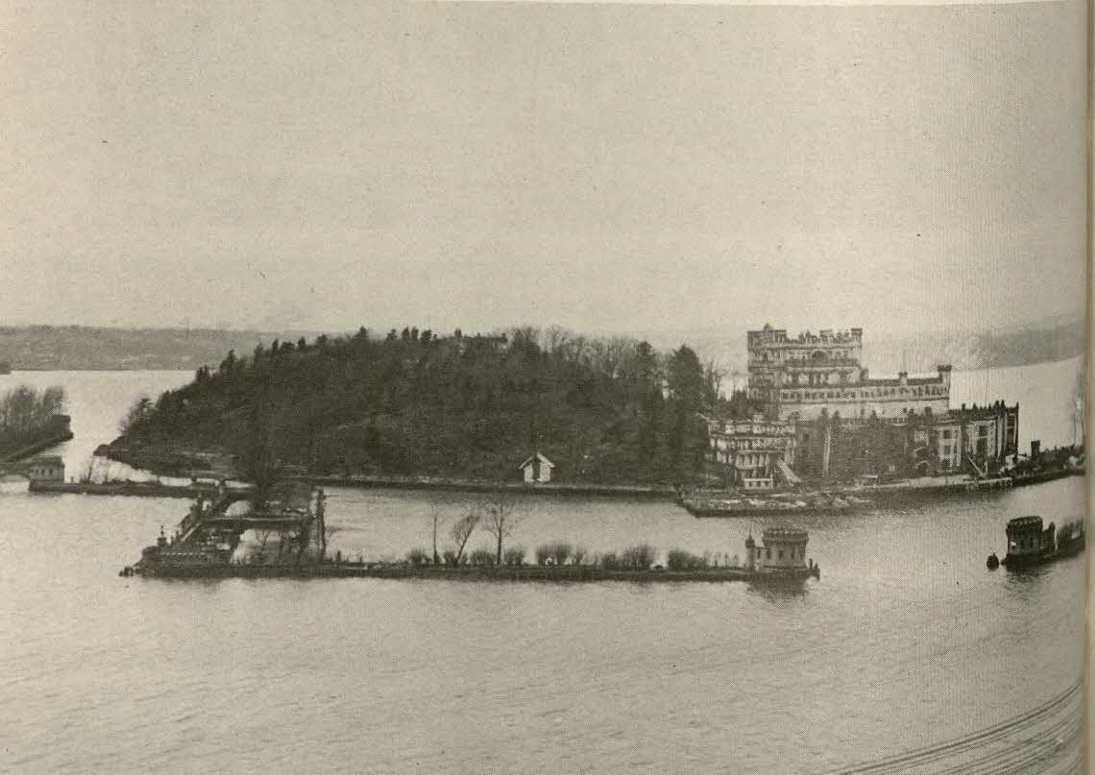
The great bay that bears Henry Hudson's name was also the cause of his death. During an exploration trip to the bay in 1610, his ship *Discovery* was imprisoned in an ice jam all winter. When spring came and food supplies ran low, his crew mutinied. They took possession of the ship and put Hudson, his fourteen-year-old son, and seven faithful men in a small open boat and cast them adrift. They were never heard from again. Hudson's map of earlier voyages in the Arctic is shown below. It is taken from a book published in 1612.

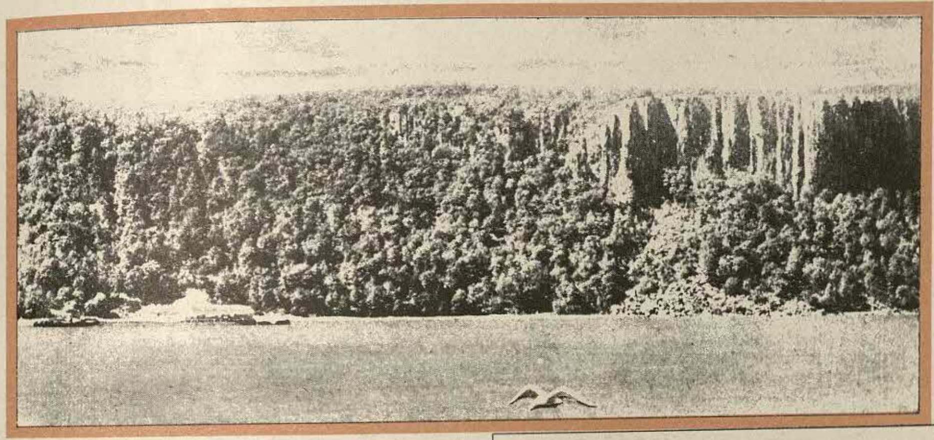


United Press

THE HISTORIC HUDSON

Above, the towering skyscrapers of New York City stand beside the Hudson River where it meets the sea. Below, Bannerman's Island, an arsenal on the Hudson, is fashioned after a Scottish feudal stronghold. Guns and munitions were stored here after the Civil War.





A STORIED RIVER

The historic scenes along the Hudson have been made famous by authors. The Palisades (above) are seen from river steamers (right).

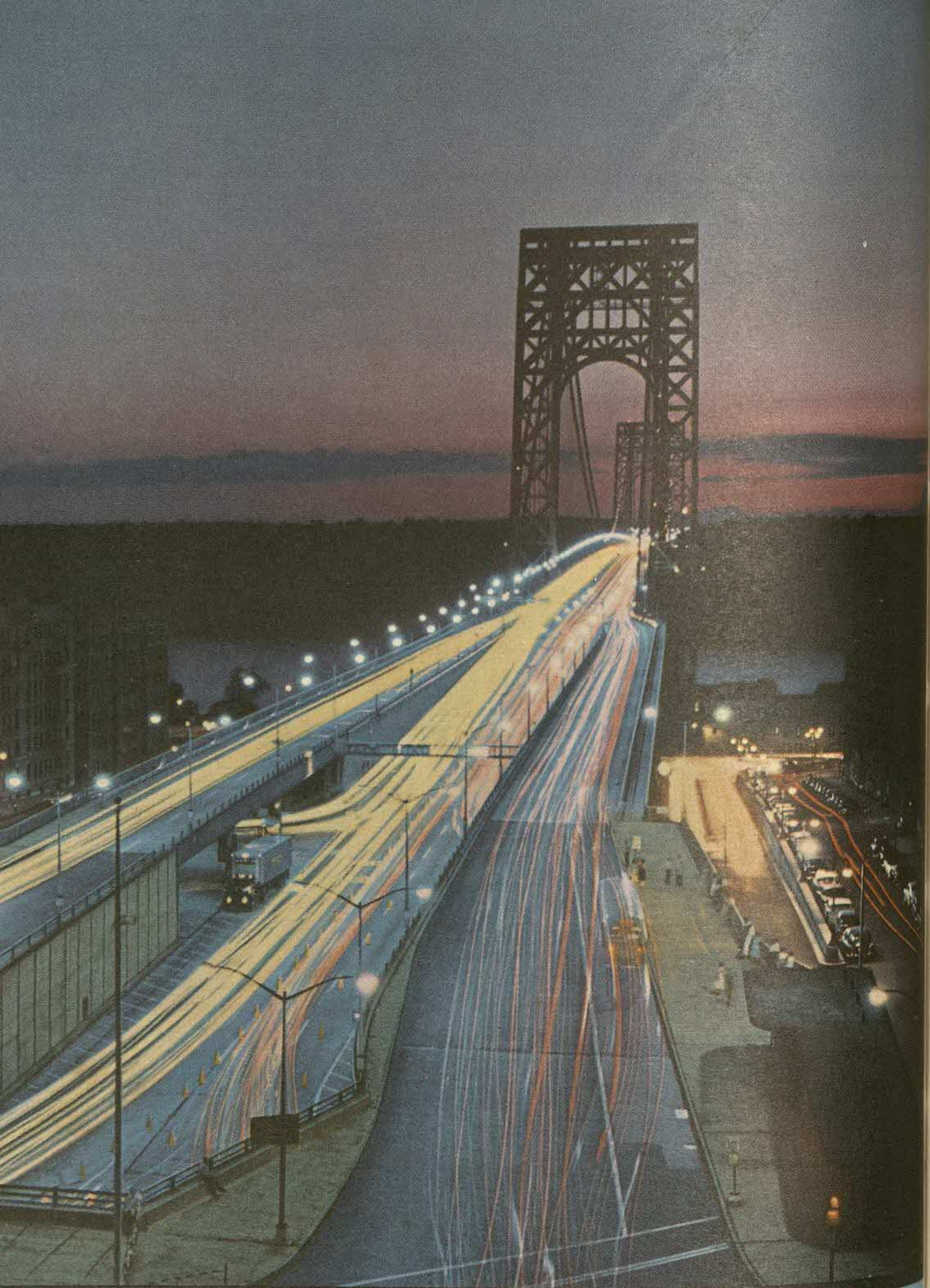
wide and extending north and south for 1,300 miles, including James Bay and Fox Channel. Its shores, except for the highlands along the east, are low, flat, and often swampy. The bay itself, except for two chains of islands near the eastern shore, is clear and free from islands. It covers an area of about 400,000 square miles, almost surrounded by land—the provinces of Manitoba, Ontario, and Quebec. The Fox Channel leads to the Arctic Ocean, and Hudson Strait to the Atlantic.

If it were not for the fact that Hudson Bay is closed to navigation for more than half the year, it would be Canada's most valuable outlet to the sea, for it affords the shortest water route to Europe from the western wheat country. Although the bay is never entirely frozen over, Hudson Strait is not passable in winter. Several important rivers drain into Hudson Bay. The largest cities are Churchill and Port Nelson, located at the mouths of the rivers for which they are named. The chief articles exported from the Hudson Bay ports are grain, timber, and various mineral ores.

HUDSON RIVER. Rising high up in the Adirondack Mountains, the Hudson River rushes down the steep mountain slopes to its broad level valley, where it follows a leisurely course of 300 miles to its mouth at New York City. At Glens Falls there is a drop of fifty feet in the river bed, and a dam built here furnishes valuable water power.

Although the Hudson is navigable only for 150 miles, it is one of the most important commercial rivers in the world. It is busiest at its mouth, and at New York City it forms a great harbor where the largest liners and cargo ships from all over the world dock to unload their passengers and freight. On the New Jersey shore are located large manufacturing plants and refineries, which are served by numerous freight boats that crowd the river in its lower course. For most of its length the Hudson is more than a mile wide, and it is deep enough to accommodate the largest ships as far north as Albany. Six miles farther north is Troy, the head of navigation, from where the Erie Canal leads off to Lake Erie.

The Hudson is famous for its beauty, and from Albany to New York the rocky banks are high and forest-covered. In its



Cities Service

A GIANT BRIDGE CARRIES PEOPLE AND GOODS ACROSS THE HUDSON
George Washington Bridge connects New York City with New Jersey. Its river span of 3,500 feet is one of the world's largest. Auto lights show as streaks in this time exposure.

lower course are the towering Palisades, stretching for sixteen miles on the west bank. New York City, Hoboken, Yonkers, Newburgh, Poughkeepsie, Albany, and Troy are the largest cities along its banks.

Hudson River was discovered by Verrazaño in 1524, but was first explored by Henry Hudson in 1609. During the Revolutionary War, several battles were fought along its banks; and when the English held control, it split the colonies. Today it is an important commercial waterway, and its level valley joins with the Mohawk Valley to provide one of the best routes westward.

HUDSON'S BAY COMPANY, an English organization chartered by Charles II in 1670. Originally headed by Prince Rupert, this company had sole trading rights with the Indians and was almost a government in itself.

The company grew slowly while Canada was controlled by the French; but after the British conquered New France, its trade and profits expanded. Competition sprang up that amounted to warfare at times. The principal rival, the Northwest Company, was absorbed in 1820.

The Hudson's Bay Company continued to grow until it occupied most of the Northwest from the Arctic Ocean south and west to the Pacific. Fur trading was the principal occupation and trading stations dotted every part of the country. In 1859 the company's trade monopoly was abolished, but it remains the world's leading fur-trading company.

HUGHES, CHARLES EVANS (1862-1948), had a distinguished career as lawyer, governor, and Chief Justice of the Supreme Court. Born at Glens Falls, N.Y., Hughes was educated at Colgate University, Brown University, and Columbia Law School. In 1906 and 1908, he was elected governor of New York. In 1910 he was appointed Associate Justice on the United States Supreme Court.

In 1916 he resigned to oppose Woodrow Wilson for the Presidency, and was defeated. He later served as Secretary of State from 1921 to 1925. President Coolidge appointed him to the Permanent Court of Arbitration at The Hague in 1926, and in 1928 he was elected to the World Court by the League of Nations.

Chief Justice William H. Taft died early in 1930, leaving a vacancy in the Supreme Court. Hughes's record of public service made it logical for President Hoover to appoint him. Hughes acted with real judicial temperament, voting as often with the liberals as with the conservatives. He served with distinction until he resigned in 1941.

HUGO, VICTOR MARIE (1802-1885), outstanding French poet, novelist, dramatist, and essayist. Son of an army general, Hugo was born at Besançon, and educated at Madrid and Paris. His first volume of verse was published when he was twenty, followed by a romantic novel *Han d'Islande* in 1823.

A drama *Cromwell,* published in 1827, marked his change from classical to romantic writing; *Hernani,* a later drama, stirred up even more conflict. Other plays of this period included *Marion Delorme, Lucrezia Borgia, The King Amuses Himself,* and *Ruy Blas.* He also wrote another novel *Notre Dame de Paris* and more volumes of poetry.

Hugo had been trained in the traditions of monarchy and, at first was a firm believer in the right of kings to rule. But in 1848 he turned from the royalist cause to champion democracy. When Louis Napoleon came to power in 1851, Hugo escaped to Brussels. He published two satires aimed at the French regime and was banished. He eventually settled on the island of Guernsey, where he wrote *Les Miserables,* one of the outstanding novels of all time. While on this island he also wrote two other great novels, *The Toilers of the Sea* and *The Man Who Laughs.* He also produced another volume of poems *Contemplations.* He was past seventy when he published his last novel.

HUGUENOTS, *hu' geh nots.* One of the greatest religious struggles of history was that waged by the Catholics against the Huguenots, the people of France who adopted the Calvinistic form of Protestantism.

Politically, the rise of the Huguenots during the reign of King Henry II of France endangered the rule of the Catholic nobility. Henry of Navarre, the Prince of Condé, Admiral Coligny, and other well-known men joined the group, and conflict seemed imminent. Francis II came to the throne and, being weak and young, was influenced by the Duke of Guise. The result was persecution of the Huguenots.

Francis died in 1560, and Charles IX became king. The real ruler at this time was Catharine de' Medici, his mother. At first, in order to check the growing power of the House of Guise, she sided with the Huguenots, but when the Huguenots grew in strength she joined the Catholic faction. This policy resulted in the bloody Massacre of Saint Bartholomew's Day, on August 24, 1572, in which many Huguenots were slaughtered.

Sympathetic to the Huguenots, Henry of Navarre, as Henry IV, issued the Edict of Nantes in 1598, which gave to the Protestants all rights enjoyed by other people, and the privilege of holding public office. Cardinal Richelieu curbed the political power of the Huguenots in 1624.

The conflict appeared settled until Louis XIV came to the throne. A devout Catholic, he condemned the Huguenots and revoked the Edict of Nantes in 1685, and the exodus of Huguenots began. Before long 500,000 had left the country, many of whom settled in America. During the reign of Louis XVI, the repressive measures were removed, and when the great French Revolution occurred, the Huguenots and Catholics became equals. That ended the struggle. See HENRY IV; FRANCE.

HULL HOUSE. To give the poor, the underprivileged, and the foreign-born an opportunity to educate themselves and to take their places as good citizens, Jane Addams and Ellen Starr in 1889 founded Hull House, a world-famed social settlement located in a crowded section of Chicago. The work is still carried on.

Directed by Miss Addams until her death in 1935, Hull House provides recreational facilities and cultural advantages for the people of the district. Handicrafts, trades, and regular school subjects, as well as art and music, are taught, and rooms are provided for the various boys' and girls' clubs. A gymnasium, a restaurant, and a little theater are in operation. The settlement actively promotes the health and well-being of the neighborhood residents. See ADDAMS, JANE.

HUMANE SOCIETIES. See CRUELTY TO ANIMALS, SOCIETY FOR THE PREVENTION OF.

HUMBOLDT, *hum'bohlt,* FRIEDRICH HEINRICH ALEXANDER, Baron von (1769-1859). A lifetime of research on the part of Friedrich H. A. Humboldt, noted German geographer, laid the foundation for the modern science of physical geography, the study of the features of the earth's surface. The first volume of the famed geographer's greatest work, *Cosmos,* appeared in 1845, in which he set forth his theory that all the forces of nature have some relationship with each other.

Humboldt was born in Berlin, but soon moved to Potsdam. Educated at the universities of Frankfort-on-the-Oder, Berlin, and Göttingen, he later studied mining and botany at Frieberg, and was a mine overseer in Franconia for a time.

HUMID'ITY. This term refers to the amount of moisture present in the air. On a hot day after a rain, the atmosphere usually becomes very heavy, causing the skin to feel "gummy" and clothes to become damp. This condition means that the air is very moist and is not absorbing the normal amount of moisture from the body.

Moisture or vapor in the air is gathered by evaporation from seas, rivers, and lakes, and from the ground and plants. Temperature and pressure are controlling elements in humidity. Warm air can hold more vapor than cold, for there is more space between its molecules. As air cools, vapor condenses (see CONDENSATION). Air is said to be *saturated* when it contains all the moisture it will hold at a given temperature.

Humidity is very important in connection with the heating of homes, for too little moisture in the air is unhealthful.

Consult the following titles for additional information:

Climate
Cloud
Dew
Fog
Heating and Ventilation
Rain

HUM'MING BIRD. Who has not watched the brilliant little humming bird, with whirring wings, hovering before a flower while it sips the nectar or catches an insect hidden there! The family of humming birds is a very large one and wholly American, but most species belong in Central and South America, only seventeen being found in the United States. All but one of these are confined to the West. They have no song. Their courage is unlimited, and they will attack and drive away even large birds.

The *ruby-throated* humming bird is common throughout the eastern part of the United States and of Southern Canada, wintering from Florida southward. It is about three and a half inches long, and is a shiny green in general color, the male having a brilliant, metallic-red throat. On a slender branch, six to fifty feet from the ground, this humming bird builds a beautiful little nest consisting of plant down and soft fibers bound with spiders' webs and covered with lichens. Two tiny white eggs are laid. The young are naked when hatched, and are fed on food from the crops of the parent birds.

HUMPERDINCK, *hoom'per dingk,* ENGELBERT (1854-1921). Children the world over know and love the fanciful operas of Engelbert Humperdinck, the renowned German composer. Taking his stories from familiar legends and fairy tales, he set to music the adventures of *Hansel and Gretel, The Snow Maiden,* and *The Children of the King.*

Best known for these operas, Humperdinck also composed more serious works. He was a firm friend of Richard Wagner and an ardent supporter of the modern movement in music.

ELUSIVE WINGED BEAUTY
The vividly colored humming bird hovers gaily over blossoms, seeking the flower's nectar.

HU'MUS. By humus is meant decayed organic matter in the soil. It is formed mainly by the decay of plants which have grown in the soil, or by the decay of plant materials which the farmer applies, such as manure. Soils which contain the most humus are prairie soils, and those which have been formed in water, such as muck soils. Sandy soils usually contain the least humus, some having scarcely any. Humus is formed by the action of bacteria in causing the decay of fresh organic substances. Conditions favoring the formation of humus in soils are an abundance of organic matter, such as roots of plants; plenty of moisture, and an abundant supply of lime, to hasten bacterial action.

Humus gives life to the ground, improves soil texture, increases the soil heat and air, makes a home for bacteria, yields a supply of nitrogen, and liberates various other plant foods.

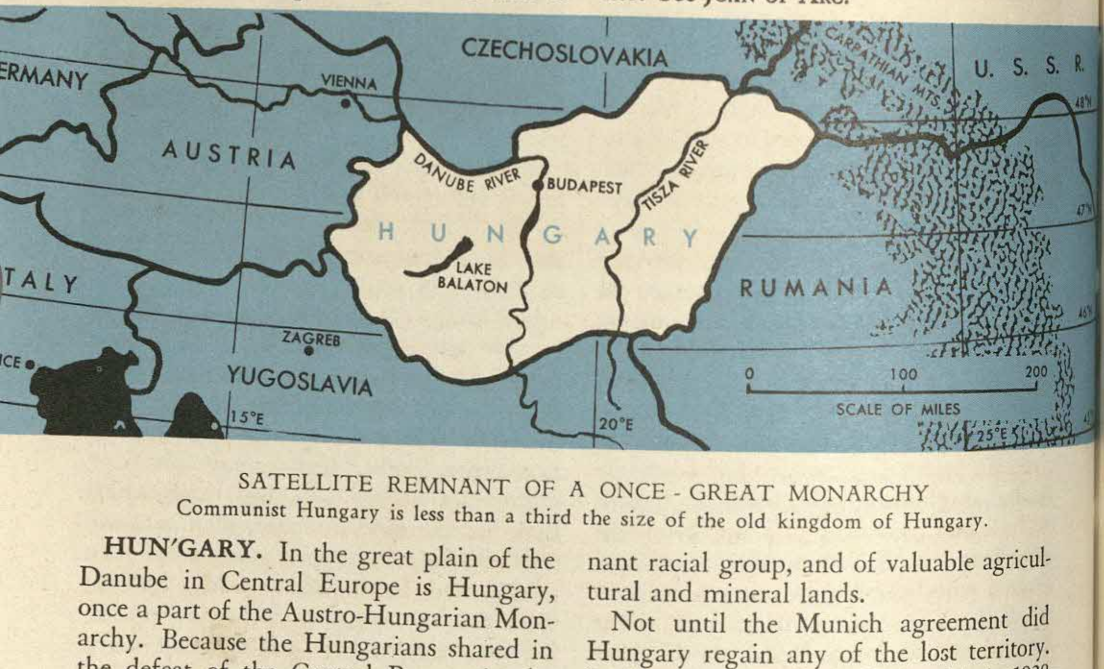
HUNDRED YEARS' WAR. For many years France and England had quarreled about supremacy in France; but finally, in

1337, there began a series of wars which lasted off and on for more than a century. This series of wars has become known as the Hundred Years' War.

The trouble began when Edward III of England claimed to be king of France because his mother was a sister of King Charles IV of France. But Philip VI, a cousin of Charles, was crowned instead.

At Crécy, in 1346, there occurred the first great battle of the war—the first battle in which guns were used. It was a great victory for the English. Ten years later the English won another great victory at Poitiers. But the English were never able to hold for long the ground they won, and the French, under Du Guesclin, had driven them out before Charles VI succeeded to the throne. War was resumed however, in 1415, when the English were again victorious in the Battle of Agincourt. Five years later, by the Treaty of Troyes, Henry V of England forced Charles VI to name him heir to the French throne.

In 1429, however, the French, under the inspired leadership of Joan of Arc, drove out the British. Gradually England lost her possessions, until by 1453 (considered the end of the war) only Calais remained to her. See Joan of Arc.



SATELLITE REMNANT OF A ONCE - GREAT MONARCHY
Communist Hungary is less than a third the size of the old kingdom of Hungary.

HUN'GARY. In the great plain of the Danube in Central Europe is Hungary, once a part of the Austro-Hungarian Monarchy. Because the Hungarians shared in the defeat of the Central Powers in the First World War, they lost over two thirds of their territory in the postwar settlements. To Rumania went the richly endowed province of Transylvania. Other cessions were made to the new nations, Czechoslovakia and Yugoslavia. Hungary was left with 35,875 square miles of territory, an area little greater than that of Maine; and the population was reduced by 10,000,000. These losses were bitterly resented by the people, for they deprived the country of millions of Magyars, the dominant racial group, and of valuable agricultural and mineral lands.

Not until the Munich agreement did Hungary regain any of the lost territory. In the partitions of Czechoslovakia in 1938 and 1939, Hungary obtained territory in Southern Slovakia and the whole of Ruthenia (Carpatho-Ukraine). After invading Slovakia, Hungary acquired 385 square miles on the Slovak-Hungarian frontier, and in 1940 annexed the northern portion of Transylvania. By 1942, Hungary had an area of 66,409 square miles; but its armistice with the Allies in January, 1945, compelled it to relinquish all territories acquired after 1937, as an ally of Germany.

Features of the Land. Flowing through

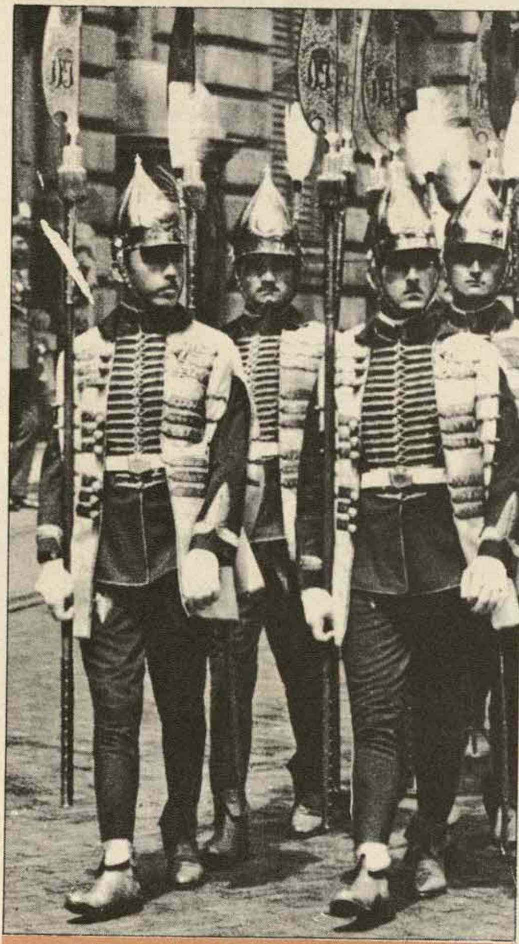
MEDIEVAL HUNGARY GETS A YOUTHFUL KING
Even in feudal days, proud Magyars sometimes chose their rulers. One of the most celebrated was the boy Matthias, elected in 1458 to the crown of Saint Stephen.

Hungary from north to south for 200 miles is the Danube River, the principal waterway of the country. The only other large stream is the Tisza. These two rivers are vitally important to the agricultural life of the nation, as they traverse and drain the great wheat and corn belts upon which the country depends. The plains gradually slope upward in the northeast toward the Carpathian Mountains, which separate Hungary from Soviet Russia. Lake Balaton, in the southwest, is the largest of several lakes.

Products and Resources. More than half the people of Hungary make their living by farming. The principal crop is wheat; other important products are corn, rye, barley, oats, potatoes, and sugar beets. Horses, cattle, sheep, and pigs are raised in large numbers. Vineyards are extensively cultivated and supply the great wine industry, the outstanding product of which is the famous Tokay wine. The north shore of Lake Balaton is also a productive wine region. Hungary has also valuable timberlands, which cover an area of about 5,000,000 acres.

The most extensive mineral deposits are those of bauxite, the ore of aluminum. There are also large coal deposits, notably in the Mecsek Mountains. Hungary's oil wells were developed by American capital. The salt mines in the restored northern regions take care of domestic needs, but Hungary must import coal and oil.

Manufacture and Trade. In normal times, the most important industries are based on agriculture, and include flour milling, distilling, sugar refining, and the manufacture of textile products from hemp and flax. There are also iron and steel works. Flour, wheat, animal products, sugar, and electrical apparatus are among the exports. Imports include raw materials, machinery, and paper. Budapest, the capital, is the leading commercial center.



HUNGARY IN FORMER TIMES
Pageantry has disappeared under the Communist government. Above, changing of the guard. Right, a springtime festival.

The People. Including the people of the acquired areas, the population was about 15,000,000. In addition to the Magyars, who made up about seventy-five per cent of this number, there were minority groups of Ruthenians, Germans, Slovaks, Croatians, and Rumanians. Today the population of Hungary is about 9,857,000.

The largest religious organization is the Roman Catholic Church. All religious groups enjoy freedom of worship.

School attendance is compulsory for all children up to fifteen years of age. There are secondary schools teaching the classics and science, and four universities.

History. Hungary has been possessed and ruled by the Magyars almost continuously since the end of the ninth century, when Arpad the Great conquered all of Transylvania and Hungary. For the next century the country was ruled by pagan dukes, but in the year 1001 Stephen I (Saint Stephen) was crowned the first Christian king. He improved the country and established schools and churches.

During the medieval period, King Matthias, who ruled from 1458 to 1490, brought victory and glory to the kingdom. He added considerable territory to the realm, and encouraged learning and art. Because of her rich agricultural lands, Hungary was desired by the Turks, who invaded the country several times. In 1526 the army of Hungary was annihilated by the Turks at the Battle of Mohacs. A large part of the country was annexed to Turkey and the rest was ruled by the Hapsburgs of Austria. There then began constant conflicts between the Hapsburgs and Turkey for control, lasting until the beginning of the eighteenth century, when all Hungary was joined with Austria. (For the history of Hungary to World War I, see article on AUSTRIA-HUNGARY.)

When the Hapsburg empire collapsed in 1918 Hungary attempted to found a republican government. A few months later there was a revolution and the country was then ruled by the communist Bela Kun. He was soon driven from power and Hungary became a monarchy, but without a king. In 1920 Nicholas Horthy became regent. Horthy remained in power until the latter part of World War II.

A Government of Liberation, set up in December, 1944, surrendered Hungary to the Allies in January, 1945. In November, 1945, Hungary held its first free elections, and in 1946 the national assembly established a republican form of government. Hungary was under Allied control until a peace treaty was signed in 1947.

Communist strength grew rapidly in Hungary. In 1945 Communists held 70 seats in an assembly of 409. In 1949 they had 285 out of 395 seats. The Communists succeeded in removing everyone who opposed them including the Catholic Cardinal Joseph Mindszenty, who had opposed the government on the question of education. Gradually a completely Communist regime was established. A revolt in October, 1956, was crushed by Russian troops and tanks.

Courtesy Holland-America Line

LAND OF THE PICTURESQUE
Hungarians really *wear* the quaint costumes shown in tourist guides. Here are two of them.

HUNS. One of the fiercest barbarian tribes ever to invade Europe were the Huns, who came from Asia. In the second century B.C., these savage people warred against the Chinese, who succeeded in driving them into Central Asia. From there they migrated slowly westward, growing stronger and more numerous as other Mongolian people joined them. They divided into two groups, one settling in Turkestan and the other moving into Europe, where they wrested lands from native tribes between the Volga and the Don rivers. At the end of the fourth century they attacked the Ostrogoths. After defeating them, they vanquished the Visi-

Gaines Dog Research Center

HALF THE SPORT OF HUNTING—A GOOD DOG

The setter has been the companion of North American hunters longer than any other breed of pointing dog. Its natural instincts to spot game are quickly developed and easily trained. It is also a large and active dog. Above, a setter, eager for the hunt and happy for the opportunity to exercise, races across a field in full stride.

QUICK FREEZE

Left, receiving the scent of a covey of birds, the setter interrupts its full stride to freeze in a motionless point. It will hold point until the birds depart or until it receives a command from its master.

Ewing Galloway

goths and occupied their lands in the valley of the Danube.

A great chief named Attila arose, and under his leadership the Huns invaded Western Europe. They moved into Gaul in 451 and were decisively defeated at Châlons. Later they swept into Northern Italy, where they were again turned back. With the death of Attila in 453, the Huns broke up and their empire disappeared. See ATTILA.

HUNT'ING. Men were hunters long before they were farmers, traders, artists, or warriors. The greatest need of primitive man was for food, and the first way of obtaining food was to hunt and kill animals.

Hunting in civilized countries today is principally a sport, but one which is becoming less popular as game decreases, and as restrictions such as closed seasons and other outdoor activities increase. But each year many men don hunting clothes, go into the woods, and try their luck in bagging wild ducks, geese, pheasants, grouse, quail, squirrels, rabbits, deer, moose, or bear. Some may journey to the jungles of Africa and India to hunt lions, elephants, tigers, leopards, and other wild beasts. Hunting, too, may be a business, for many furs and feathers are still secured by the use of the rifle. Usually, however, animals are trapped or raised domestically for this purpose. Then, too, men hunt timber wolves, mountain lions, coyotes, and such animals, to remove menaces to man and domestic animals.

The history of hunting is the history of arms. Prehistoric man first used his hands, then stones, clubs, hatchets, knives, flint arrowheads, spears, and finally iron and bronze implements. Bows and arrows were used until the Middle Ages, when gunpowder came into use. After that the rifle became the common hunting implement, although some men, to make the sport more exciting, have again adopted the use of bow and arrow. One form of hunting was the use of falcons which seized small prey and brought them back to their masters. See FALCONRY; GAME.

HU'RON. France was aided in its explorations of the New World by the Huron Indians, a tribe living east of Lake Huron. The friendliness shown by the Huron dated from 1609, when Champlain befriended Algonquin Indians in their wars with the Iroquois. The Huron were allied with the Algonquin, although their relationship to the Six Nations was closer than it was to the northern Indians.

Despite French aid, the Iroquois finally drove the Huron out of their land by the use of English guns; and the Huron settled near the site of Sandusky, Ohio. There they received the name of Wyandotte. Today there are only a few hundred left, half of whom live on reservations in Oklahoma, the rest in Quebec and Ontario.

HURON, LAKE. One of the great inland seas of North America is Lake Huron, forming part of the boundary between Canada and the United States. It is the second largest of the Great Lakes and has an area of 23,010 square miles. Lake Superior drains into it through the Saint Marys River, and Lake Michigan through the Straits of Mackinac. Lake Huron, in turn, drains into Lake Erie through the Saint Clair River, Lake Saint Clair, and the Detroit River.

Lake Huron's coast line is very irregular and is deeply indented by bays, the largest of which are Georgian Bay and Saginaw Bay. At the northern end of the lake is Mackinac Island; Manitoulin Island lies between Huron and Georgian Bay. Lake Huron has fewer and smaller harbors than any of the other Great Lakes. The most important are Saginaw Bay and Thunder Bay on the west shore. The lake's chief ports include Sarnia, Kincardine, Goderich, Owen Sound, and Collingwood, Ont., and Port Huron, Bay City, Alpena, and Cheboygan, Mich. Traffic is heavy during the shipping season. In winter, ice and storms halt navigation. The lake, named for the Huron Indians, who lived along its shores, contains many kinds of fish. See GEORGIAN BAY; GREAT LAKES.

Keystone

WHEN A TROPIC BREEZE GOES WILD

In just a few minutes the terrific blast of a hurricane can wreck whole towns. Such a storm blew out of the Gulf of Mexico and devastated Long Key, Florida.

HUR'RICANE. In the case of a tropical cyclone of the West Indian region, the whole storm is called a hurricane. Tropical cyclones originate over the oceans in the *doldrums,* the equatorial belt of calms, at seasons when they are farthest from the equator. As the cyclones are rotary storms and owe their continued existence and destructive violence to the low pressure resulting from this rotation, they can only occur far enough from the equator to be at a latitude where the deflective effect of the earth's rotation becomes measurably appreciable (see WIND).

In the western portion of the North Atlantic, the doldrums are farthest north in the latter half of summer, but calms occur far enough from the equator, even as late as October, to provide the breeding spots necessary for hurricanes. The autumn inrush of cold air from North America readily provides the conditions which must aid in forming a hurricane. It is not surprising, therefore, that West Indian hurricanes are most frequent in August, September, and October.

The well-developed tropical cyclone consists of a violent, spiral whirl of winds, fifty or more miles in diameter, around a calm center having very low pressure. The inflowing air is forced to ascend, making an extensive cloud sheet and resulting in a torrential rainfall. The cloud sheet spreads out above to great distances from the center, and the great swells in the ocean are projected still farther, sounding their ominous warning on coasts a thousand miles away before the storm.

These hurricanes usually travel first northwestward, then northward and northeastward, and frequently inflict great damage along the Gulf and South Atlantic coasts, leveling coastal towns, endangering shipping, and destroying crops.

HUSS, JOHN (about 1373-1415). Defense of his religious principles and beliefs cost John Huss, a Bohemian religious reformer, his life. He bitterly attacked many of the abuses of the Catholic Church and believed that there should be no religious authority over the civil life of the community. In these views, he had been greatly influenced by John Wycliffe, the English reformer who had written many books opposing the orthodox doctrines of the Church. Huss made many speeches based on his beliefs, and was ordered by Pope John XXIII to stop public preaching. This order Huss refused to obey, and the Pope called him to Rome. His second refusal of the Pope's orders brought excommunication, and he was exiled from Prague.

In 1414 Huss agreed to appear before the Council of Constance, which found him guilty of heresy. The law provided death for this crime, and Huss was burned at the stake on July 6, 1415.

Huss had studied philosophy and theology at the University of Prague and in 1398 was made a professor. Having been ordained a priest in 1401, he was later made dean of the philosophic faculty and preacher to the Bohemians. During this time he translated many of Wycliffe's works into Bohemian. Huss acted as the link between the reforms of Wycliffe and the Reformation, which began with Martin Luther's revolt against the authority of the orthodox Church. See HUSSITES; REFORMATION, THE.

HUS'SITES. The history of the Hussites, the group which followed the beliefs and principles of John Huss, is one of many bitter battles with the civil authorities of Prague. After the death of Huss, the leadership of the group fell to Ziska, who captured Prague and severely defeated the troops of Emperor Sigismund. In 1424, upon Ziska's death, Procopius succeeded Ziska and won many important victories for his followers. The group later split into the Taborites and the Calixtines, the latter joining the Catholic Church. The Taborites rapidly declined in importance and joined a group called the Bohemian Brethren.

HUTCH'INSON, ANNE (about 1590-1643). Banished from Massachusetts for her religious views and her attacks on the clergy, Anne Hutchinson, an early colonial religious figure, became one of the pioneer settlers who established the present town of Portsmouth, in Rhode Island. She came from Lincolnshire, England, with her husband, William Hutchinson, in 1634, and they first settled in Boston. After the death of her husband in Rhode Island, Mrs. Hutchinson migrated to a New York settlement, where she met death in an Indian raid on the town, along with her family.

HUX'LEY, THOMAS HENRY (1825-1895). While on a cruise in the South Pacific as an assistant surgeon on *H.M.S. Rattlesnake,* Thomas Huxley, famed English naturalist and biologist, studied and classified sea life in a new way and submitted reports to the various scientific societies in London. On his return, he discovered his research had brought him fame. A short time later, he was made a lecturer in natural history at the Royal School of Mines, and by the time he was twenty-five he had won a brilliant reputation as a scientist. He was one of the first to defend Darwin's theory of evolution.

Huxley, the son of a London schoolmaster, had received a rather haphazard education, but his love of reading made up for the lack of conventional schooling. Early in life (1841) he became interested in medicine, studying with a private doctor and later at Charing Cross Hospital.

HWANG HO. From its source high up on the slopes of Northeastern Tibet, the Hwang Ho, one of the great rivers of China, flows a zigzag course of 2,600 miles to the Pohai (Gulf of Chihli). For much of its length it flows through a densely settled region, but it is nearly useless for navigation because of its shifting and silt-choked channel.

The name Hwang Ho means *yellow river,* and the stream is so-called because in its upper course it picks up yellow silt, which colors the water. As the river reaches the level plains and slows down, it drops the silt, causing the channel to shift and resulting in disastrous floods. This silt, however, makes for great fertility of soil. One of the most destructive floods of all time occurred in 1931. The rich soil of the river's delta region supports one of the densest populations in the world. See CHINA.

HY'ACINTH. Fragrant hyacinths are always interesting, although they are rather stiff and formal. They belong to the lily family. Among the many varieties are plants that bear purple, blue, pink, and

W. Atlee Burpee Co.

HOME BRIGHTENER

Hyacinths make ideal potted plants, and are easy to grow. They do very well indoors.

white spikes of flowers. Hyacinths are popular in the garden and also as potted plants.

HY'BRID. Any plant or animal that results from the uniting of different breeds, races, species, or varieties is known as a hybrid. The best-known animal hybrid is the mule, offspring of the horse and the ass. Moreover, if sweet corn is planted near field corn, many of the ears of sweet corn will have smooth, as well as wrinkled, kernels. If these smooth kernels are planted the following year, the resulting corn will show characteristics of both sweet and field corn, proving it a hybrid. Such hybrids as the corn described are of no value commercially, and their seeds are usually of inferior quality.

Yet, if hybridization is skillfully handled, and two good specimens are crossed, a hybrid plant superior to either parent will often result. As soon as a satisfactory hybrid is obtained, its offspring must be carefully watched to prevent a return to the undesirable qualities of the parent plants. Hybrid roses, chrysanthemums, cannas, begonias, and numerous other flowers are products of skillful plant crossing. Many excellent varieties of grapes, wheat, oranges, and cotton have resulted from hybridization. *Citranges,* large juicy fruits similar to oranges, are much hardier than oranges and can be raised 300 or 400 miles farther north. Although inferior to the orange, this fruit makes excellent marmalade and beverages.

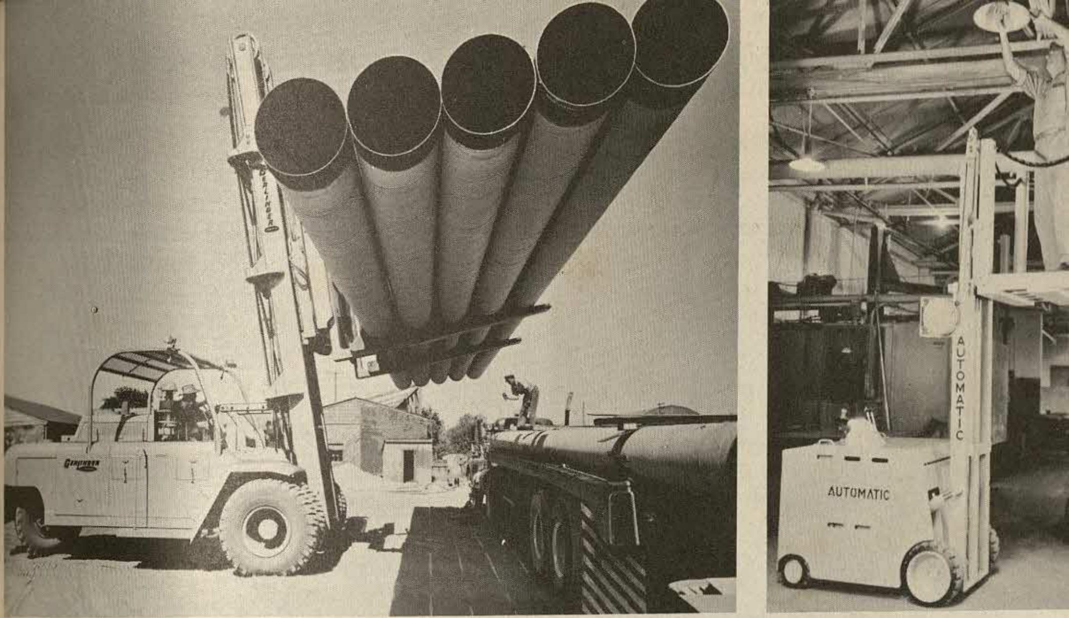
Another example of hybridization is a variety of apples produced in Canada. These apples, unusually cold-resistant, were produced by crossing the hardy crab apple with good apple varieties that grew in milder climates. Foremost of the experts in hybridization or cross-fertilization was the late Luther Burbank. See BURBANK, LUTHER.

HYDRA, FRESH-WATER, or FRESH-WATER POL'YP. A thin, threadlike animal with long, slender feelers, or *tentacles,* the fresh-water polyp is found attached to the ends of twigs and weeds in pond water. The hydra has the power to move slowly from place to place and can also extend and contract its body. At times, it stretches to a length of sixteen times its diameter, and at other times the entire organism is drawn up into a tight little ball.

The hydra gathers food by paralyzing water flies and other insects with the sharp, stinging needles found in the tentacles. These arms draw the prey toward the mouth and deposit it in the digestive tract. Hydras are reproduced by the formation of tiny, budlike structures on the parent. As these buds grow larger, they break off to form independent animals. Hydras belong to the branch *Coelenterata.* See COELENTERATA.

HYDRAN'GEA. This flowering shrub belongs to the saxifrage family. It bears enormous panicles of white flowers which appear late in summer and last until fall. The plant is very popular, but is almost too coarse and conspicuous for front lawns and small gardens. The plants should be vigorously pruned every spring to secure the largest supply of flowers.

HY'DRATES. The word *hydrate,* derived from the Greek word for *water,* usually means a compound formed by a union of some substance with definite amounts of water loosely held, though sometimes the word is used as synonymous with *hydrox-*



Towmotor Corp. *Automatic Transportation Co.*

GETTING A LIFT

Hydraulic lift trucks are used in materials handling (left) and maintenance (right).

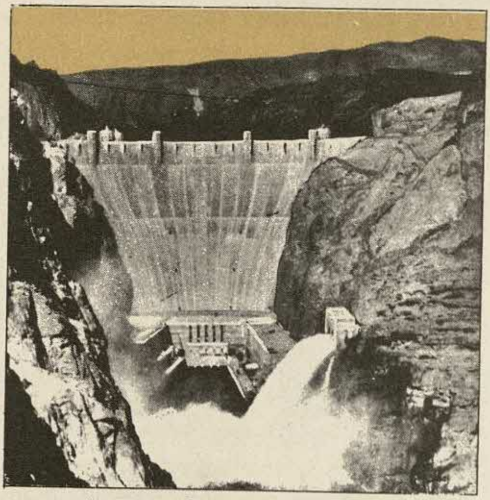
ide, alkali, or *base* (see BASE). When certain substances crystallize on slow evaporation of the water in which they were held in solution, they combine chemically with definite amounts of water. This water is spoken of as *water of crystallization.*

Some substances can unite in this fashion with different definite amounts of water, forming a series of hydrates differing in shape, solubility, etc. When heated, these hydrates lose their water of crystallization. The heated product, that is, the substance less its water of crystallization, is spoken of as being *dehydrated,* or *anhydrous,* whereas a substance containing the water of crystallization is spoken of as *hydrated,* or *hydrous.*

Thus, for copper sulphate the dehydrated form is white, whereas the hydrated form is blue. Some hydrates on standing exposed to air lose some or all of their water of crystallization. Accompanying the loss is a loss of crystalline shape, and the mass crumbles to powder. Such compounds are said to *effloresce.* Whether or not a hydrate will undergo efflorescence depends upon its ability to give off its water as a vapor to the surrounding atmosphere, and the amount of water vapor already present in the atmosphere.

HYDRAULIC MACHINES. The automobile lift in a service garage is a common application of a hydraulic machine. It also demonstrates the principles of hydraulics in which a small force can produce a large force. Other hydraulic machines are the hydraulic presses used to bale cotton, to make body stampings for automobiles, to press oil from seeds, to compress fiberboard and steel scrap, and to test the strength of various materials. Still others are the hydraulic lift truck, elevator, brakes and landing gear, winches, and the miniature hydraulic and electrohydraulic systems used in rockets, missiles, and airplane controls.

Hydraulic machines have essentially four parts. First is a *hydraulic fluid* that is often water but may be oil, bromine, silicones, or other synthetic fluids for special conditions. Second, there must be a *power source*—hand power, a pump, or a power-generating element. Third, there must be an *outlet* for the force applied to do its work. This may range from a small piston to a huge press. Fourth, there



APPLYING THE LAWS OF HYDRAULICS

Knowing how water will act under all conditions, engineers can dam it up; put it to work.

must be *connections,* such as pipes or hoses, between the source of power and the work outlet. Some hydraulic machines that are operated automatically or semi-automatically also have extra valves and controls.

HYDRAULIC PRESS. See ELECTROSTATIC PRESS.

HYDRAULICS, *hi draw'liks.* In science, hydraulics is the study of the laws of flowing liquids. There are two laws which are always considered in using these laws. The first states that the velocity of a jet of water equals that of a body which falls from the surface of the water. For example, if a jet fifteen feet below the surface of the water pours out from a dam, the velocity will be the same as that of a stone which has dropped fifteen feet.

The other rule says that, under normal conditions, a stream of water pointed vertically upward will rise to the same height as the level of its source. However, friction and air resistance have to be taken into consideration. If a barrel of water on a stand ten feet high has a pipe running to the ground and bent upward, theoretically a jet of water will flow out of the pipe to the height of the surface of the water in the barrel. There will be loss of energy due to friction in the pipe and because of air resistance.

These laws have provided the foundation for the science of hydraulic engineering, as applied in hydroelectric plants and flood control. See HYDRAULIC MACHINES; HYDROSTATICS; WATER WHEEL.

HYDROCAR'BONS. All chemical compounds made up entirely of carbon and hydrogen are known as hydrocarbons. They are of great commercial importance, forming the principal ingredients of petroleum, natural gas, gasoline, gutta-percha, asphalt, turpentine, and a host of coal-tar products.

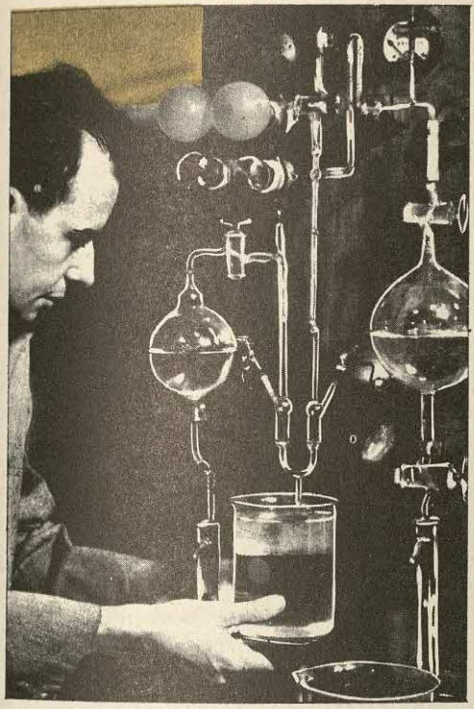
They may be artificially produced by dry distillation of many organic materials. For example, gaseous hydrocarbons are derived from coal tar by fractional distillation.

Hydrocarbons should not be confused with the carbohydrates, for the latter contain oxygen as well as carbon and hydrogen. See COAL; COAL TAR; DISTILLATION; PETROLEUM.

HYDROCHLO'RIC ACID, or MURIAT'IC ACID. HCl is the chemical symbol for the gaseous compound, hydrochloric acid. Also called *muriatic acid,* it is soluble in water, and the solution is the form in which this acid is most commonly used.

Like all acids, hydrochloric acid is sour to the taste and will turn blue litmus paper red (see ACID). It is the acid of the stomach juice of man and animals, in which it plays an important part in the digestion of proteins. Human gastric juice contains from two- to three-tenths of one per cent of this acid.

As a gas, hydrochloric acid is colorless with a pungent odor and taste. It fumes when a person blows his breath into it. It is extremely soluble in water, and the water solution of the gas is the strongest acid known. The commercial acid is generally colored yellow; when pure it is colorless. This solution acts readily on metals like iron and zinc, with bases or alkalies like caustic soda or lime, and with many substances, like limestone, forming products called *chlorides.* Its potassium salt is muriate of potash, a common fertilizer.



HYDROGEN PRODUCER
Hydrogen is easily obtained by the electrolysis of water, which also produces "heavy" hydrogen, with an atomic weight of two.

Its sodium salt is common salt. As with all strong acids, great care should be used in handling hydrochloric acid. See CHEMISTRY.

HYDROCYANIC, *hi dro si an'ik,* **ACID.** See PRUSSIC ACID.

HYDROGEN, *hi'dro jen.* The most interesting fact about hydrogen is that it is the lightest thing in the world. Its name, derived from the Greek, means *water-producing;* this element is so-called because it produces water when it burns. Hydrogen is a non-metallic element, a gas having no taste, no color, and no odor. It burns readily, and when mixed with air and brought to a certain temperature, it explodes violently. It burns with a pale flame giving off an intense heat, the temperature of a small hydrogen flame being sufficient to melt glass or small iron wire.

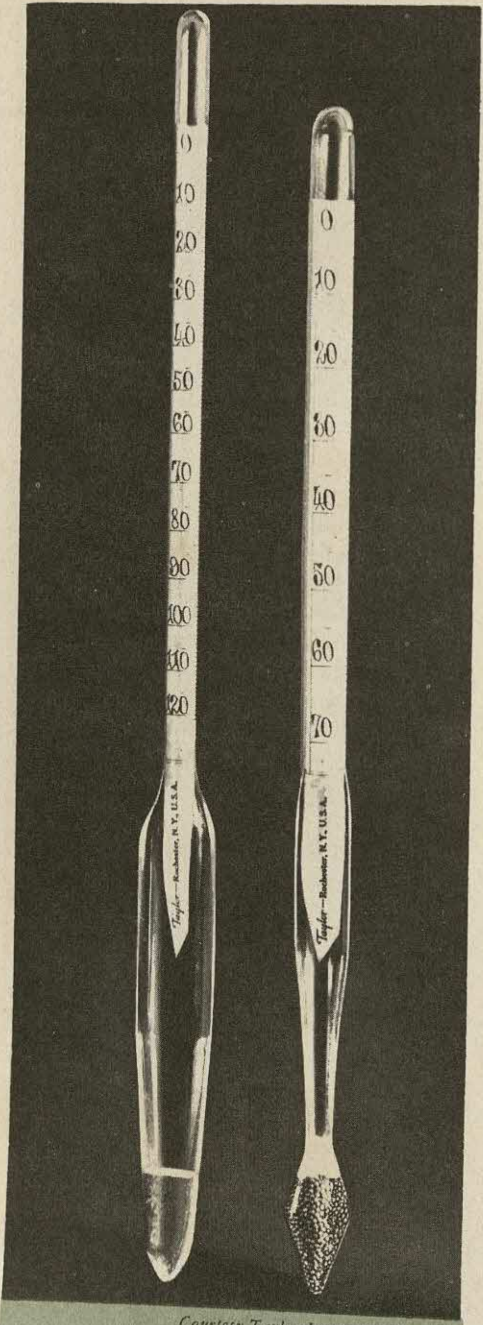
While small traces of hydrogen are present in the air we breathe, it is usually prepared in large quantities by passing steam over red-hot iron. It may also be made by passing a current of electricity through acidified water (see ELECTROLYSIS). If steam is passed over coke at high temperature, water gas, made up of hydrogen and carbon monoxide, is given off. Hydrogen may be easily prepared by dropping scraps of zinc in a dilute solution of sulphuric acid. The free gas that rises from the solution can be caught by inverting open-mouthed jars over the water.

Hydrogen is found in a combined form in water, natural gas, all acids and bases, and in the tissues of animals and plants. It occurs in many organic compounds, such as sugar, starch, and cellulose. Many metals, including zinc, iron, and aluminum, release hydrogen when placed in an acid solution. Potassium and some other elements when placed in water will also liberate quantities of the gas. Combined with carbon, hydrogen makes up an important group of substances known as hydrocarbons. Combined with nitrogen it forms ammonia; and with sulphur, it forms hydrogen sulphide, an evil-smelling and poisonous gas.

A Gas of Many Uses. Hydrogen is used to harden liquid fats to make them resemble lard, in manufacturing ammonia, to create high temperatures, as in the oxyhydrogen blowpipe, and to fill balloons and dirigibles. Because of its inflammability, it is being replaced for the latter purpose by helium. See HYDROCARBONS; DIRIGIBLE BALLOONS; HELIUM.

HYDROM'ETER. In testing the density of liquids, and occasionally of solids, the hydrometer is the instrument used. It usually consists of a graduated glass tube ending in a bulb filled with mercury or shot. The tube is closed at both ends, and sometimes contains a thermometer.

When the density of a liquid is to be tested, the hydrometer floats in it. As the Greek scientist Archimedes discovered, about 240 B. C., a liquid bouys up any body immersed in it with a force equal to the weight of liquid the body displaces. When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Taylor—Rochester, N.Y., U.S.A.
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Taylor—Rochester, N.Y., U.S.A.

Courtesy Taylor Instrument Company

ANALYSIS BY WEIGHT

Many liquid mixtures can be tested for proportion of ingredients by their specific gravities; that is, their weight in proportion to that of an equal amount of water. Hydrometers give a specific-gravity rating.

a body floats it is because its weight is exactly counteracted by buoyancy. Therefore the weight of a floating body exactly equals the weight of the liquid it displaces. Naturally, then, a dense liquid—which weighs more for each cubic inch than one less dense—will not let the hydrometer sink as far as a liquid of less density.

On the hydrometer the scales have their largest numbers at the bottom. These numbers mark the different levels which will be opposite the surfaces of liquids of various densities. The method of numbering depends on the purpose of the hydrometer. In some cases the numbers have to be interpreted with the help of a scale. In others the metric units of density are given directly (see DENSITY). In these units a liter of water weighs 1,000 grams, and the density is understood to be in grams per liter.

A hydrometer for finding the density of solids has two pans, one at the top and one at the bottom. The difference between the weight needed to sink the instrument to a given depth when the solid to be tested is on the lower pan, and that needed when it is on the upper pan, is the weight of a portion of the liquid of the same volume as the solid.

A common use of the hydrometer is for testing storage batteries. The battery fluid is drawn into a glass tube by release of the compressed rubber cap, as ink is drawn into a fountain-pen dropper. The hydrometer floats in the liquid within the tube.

HYDROSTATIC, *hi dro stat′ik̦,* **PRESS, or HYDRAULIC PRESS.** In operating elevators and hoists which must raise heavy weights, and in performing tasks requiring exertion of great force, the hydrostatic or hydraulic press is sometimes employed. Its use for hoisting is being superseded by other methods that are simpler and cheaper, but it is often used in molding mixtures of small particles into solid masses. This press makes use of the familiar hydrostatic law that pressure applied to a liquid is transmitted equally in every direction.

The press consists, in simple terms, of two pistons, *A* and *B,* operating in two water-filled cylinders having hydraulic connection. As piston *A* travels much farther than *B*, cylinder *A* is usually a pump. Pressure is transmitted to *B* on the downstroke; on the upstroke, water is drawn from a reservoir. If the cylinder in which *B* operates has 100 times the cross-sectional area of that in which *A* operates, and a pressure of one pound is applied to piston *A*, it will transmit 100 pounds of force to piston *B*. This force can be further multiplied by the use of levers in plunging the *A* piston into its cylinder. The object to be pressed or elevated is placed on a table on top of the *B* piston. Naturally, water-tight collars are required on the two cylinders.

HYDROSTATICS, *hi dro stat'iks.* Fill a bottle with water and cork it with a stopper whose area is just one square inch. Exert just one pound of force in pressing down on the cork, and you transmit exactly one pound of pressure through the water to every square inch of the inside of the bottle. If it happens that the inner area of the bottle is 100 square inches, your pound of pressure on the cork exerts 100 pounds of pressure inside the bottle.

The foregoing illustrates one of the laws of hydrostatics, the science of liquids at rest, as distinguished from hydraulics, the science of flowing liquids. Liquids exert pressure equally in all directions, and pressure is independent of the shape of the container. Another familiar hydrostatic law is that pressure increases with depth. As a diver descends into the sea, the pressure on his body increases, and he must be lowered or raised slowly to accustom himself to changing pressure, and must wear a diving suit to help him withstand the weight of the water. At the surface of the sea there is only the pressure of atmosphere; at the bottom of the sea the pressure for any given area, such as a square foot, is equal to the weight of a column of water of that area extending from the surface to the bottom.

In accordance with this law, pressure in a narrow, vertical tube will equal that in a larger tube when both are connected to the same body of water, for their depth is the same, and so pressure per square inch is equal. For example, the water stands at the same level in the spout as in the pot of a teakettle. If you were to fill a wooden cask with water, seal it, then insert in the top an iron pipe an inch wide and thirty feet or more high, and fill this pipe with water,

Courtesy Popular Mechanics

COMPLYING WITH NATURAL LAWS

The pressures of water and other liquids are studied in the field of hydrostatics. The armored diver's life depends on such a study.

the pressure of the water would burst the cask.

Another hydrostatic law is that the upward force on a body immersed in a liquid is equal to the weight of the liquid displaced. This law is illustrated by the displacement of water by a boat. It is applied in the loading of ships and barges with cargo, in the designing of ships, and in determining the specific gravity of solids. See Gravity, Specific.

HYENA. It is the apparent mission of this doglike animal to eat up the carcasses of dead animals of every sort. The hyena's habit of eating carrion makes its characteristic odor very offensive. Hyenas are strong and powerful, but very cowardly, and need not be feared ordinarily.

Hyenas are most common in Asia and in Africa. The *spotted* hyenas, of South Africa, are yellowish in color with darker spots. They roam over the country in packs. The spotted hyena is probably the animal that made the "laugh like a hyena" expression fitting and proper. This animal is said to "laugh like a human being." The *brown* hyenas of the same region have long, shaggy manes on the neck and back. The *striped* hyenas of Asia and Central Africa live in burrows or deserted caverns.

HYGIENE, *hi'jeen.* Ranking above riches, power, and achievements is that greatest of all possessions, good health. Hygiene is the branch of medical science that teaches us how to preserve our health. Its primary purpose is the preservation of health by preventing diseases and other ailments.

Personal hygiene has to do with the observance of health rules by the individual. Aside from the satisfaction of enjoying good health, the individual has an obligation to the community. The healthy person is not apt to be a carrier of disease germs. For some of the health rules anyone can practice, see Health.

Domestic hygiene treats of conditions in the home, including not only the selection and preparation of foods, but general sanitation in the home. It also treats of the proper training of the children for good citizenship by emphasizing the importance of hygiene.

Public hygiene has made tremendous strides since the beginning of the eighteenth century. Better housing, plumbing, ventilation, water supply, and street cleaning, and the extermination of flies, mosquitoes, and rats have done much to bring about a decrease in disease. As a result of public-health education, the average length of life of the individual has greatly increased.

Consult the following titles for additional information:

Antitoxin
Bacteria and Bacteriology
Bath
Breathing
Fly
Food
Germ Theory of Disease
Health
Health, Boards of
Heating and Ventilation
Housing Problem
Mosquito
Sanitary Science
Sewage and Sewage Disposal

HYPNOTISM, *hip'no tiz'm.* Perhaps this word brings first to your mind the spectacle of some man capering like a goat, or strutting in imitation of a proud general, under a hypnotic spell. Hypnotism is more than that. An expert hypnotist can place your mind under the influence of his, soothe you by quiet words, by stroking your forehead and looking you directly in the eye, by having you stare at a bright light; and by the power of suggestion he can control your actions. Under his influence you may smell, see, hear, and feel things that are not present. Actually, your memory and reason are momentarily suspended. Certain physicians have made use of hypnotism to treat nervous ailments and sleeplessness, and even to perform minor surgical operations.

Hypnosis cannot be forced upon the subject. It is certain that the subject must be willing to be hypnotized; in fact, he must co-operate and must possess a strong mind. Furthermore, he cannot under hypnosis be forced to carry out an order contrary to his own character, such as the commission of a crime. However, no person should ever permit himself to be hypnotized by anybody unknown to him personally.

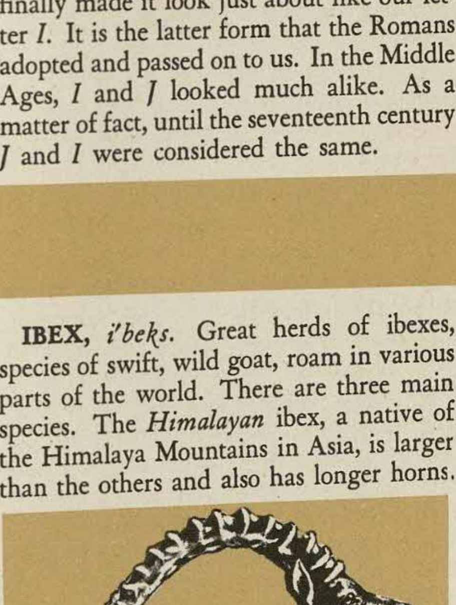
I. Through the long history of the alphabet, the letter *I*, the ninth in our alphabet, has had a checkered career. Originally, in Phoenicia, it is supposed to have signified a hand held in profile, and it looked like this, The early Greeks changed it to look like this, , but finally made it look just about like our letter *I*. It is the latter form that the Romans adopted and passed on to us. In the Middle Ages, *I* and *J* looked much alike. As a matter of fact, until the seventeenth century *J* and *I* were considered the same.

IBANEZ, *e bah'nyath,* VICENTE BLASCO (1867-1928). Famed for his novel, *The Four Horsemen of the Apocalypse,* Vicente Blasco Ibanez was a distinguished and successful Spanish novelist. Born in Valencia, he spent several years in the Argentine, which inspired *The Four Horsemen.* Other works by this Spanish author are *Blood and Sand, The Temptress,* and *The Shadow of the Cathedral.* Many of his novels were popularized as motion pictures.

IBE'RIA. The peninsula now occupied by Spain and Portugal was called Iberia by the ancient Greeks. Often called Europe's most ancient nation, the Iberians form the basis of the peoples of Italy, Gaul, Spain, and Portugal. The descendants of this race, now living in Northern Spain, are called Basques; they still speak the ancient Iberian tongue. Iberia was called Hispania by the Romans.

IBERVILLE, *e bair veel',* PIERRE LE MOYNE, Sieur d' (1661-1706). Founder of the French province of Louisiana in 1699, Pierre Iberville, French-Canadian soldier, explored the Gulf of Mexico and the mouth of the Mississippi River. He founded settlements at Biloxi and Mobile. He was born in Montreal and served in the French navy.

IBEX, *i'beks.* Great herds of ibexes, species of swift, wild goat, roam in various parts of the world. There are three main species. The *Himalayan* ibex, a native of the Himalaya Mountains in Asia, is larger than the others and also has longer horns.



BORN MOUNTAIN CLIMBER
The ibex, wild goat of the mountains.

Once found in the mountains of Central Europe in large numbers, the *European* ibex (the French *bouquetin* or the German *steenbock*) is now very rare. There is also an *Arabian* ibex, native to Palestine and Upper Egypt.

Flat horns which sometimes grow to a length of more than fifty inches are the distinguishing characteristic of the ibex. Although frequently hunted, the animal has maintained its numbers without difficulty, except in Europe. Hunting the ibex is a dangerous sport because of the wild, rocky slopes which the animals inhabit.

I'BIS. There are about thirty species of tropical storklike birds that bear the name ibis. The best known is probably the *sacred* ibis of Egypt, which was venerated by the ancient Egyptians and of which numerous mummies have been found. In America the *white* ibis occurs in the Southern states, frequenting lagoons, marshes, and mud flats in small flocks. It is white except for the tips of the wings, which are black, and the bare parts of the head, which are reddish. In common with other ibises, it has a long downward-curving bill and feeds on fish, frogs, and small crustaceans. The nest of reeds and weeds is built in a tree or bush.

IB'SEN, HENRIK (1828-1906). One of the greatest of modern dramatists was Henrik Ibsen, a Norwegian, whose historic and poetic plays are still given in America and Europe. There are frequent revivals of *Peer Gynt, A Doll's House, Ghosts,* and *Hedda Gabler,* probably Ibsen's best-known dramas. He published his first play, *Catiline,* in 1850, and *The Warrior's Mound* was staged at Christiania (now Oslo) the same year. He directed a theater at Bergen, and then, in 1857, went to the Norske Theater at Christiania.

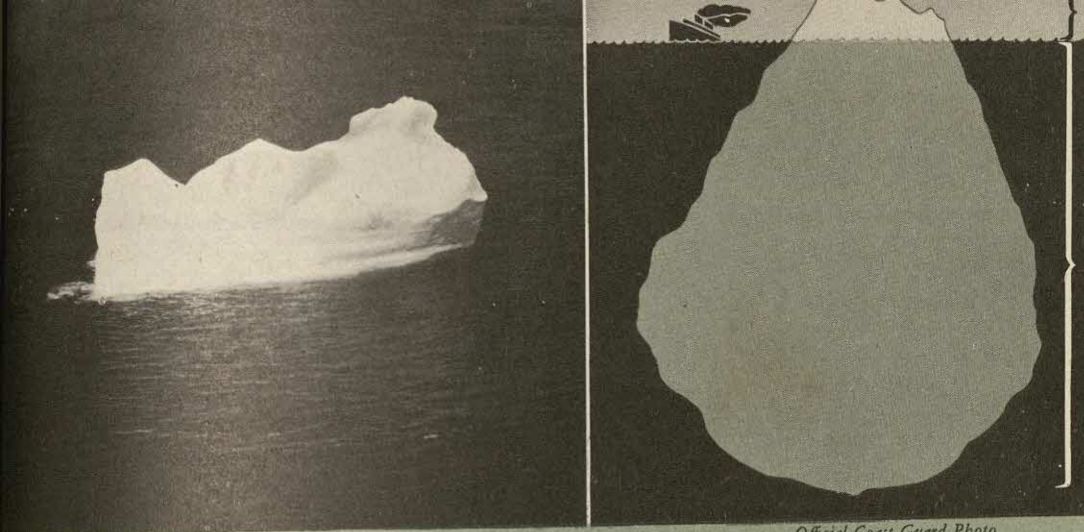
Ibsen spent several years abroad, first at Rome and then at Dresden, but returned in 1891 to his native land. His lyric poetry, his satires on modern life, his vital, fearless writing have given him an important place among literary men. Besides those mentioned above, his principal works include *Brand, When We Dead Awaken, The League of Youth, Rosmersholm, The Lady from the Sea, The Master Builder,* and *John Gabriel Borkman.*

ICE. Pure water freezes into ice at 32° F. or 0°C. Since water expands when it freezes, pressure tends to keep it from solidifying or if applied to ice, may make it melt. Thus a snowball, though colder than 32°F., if squeezed may partially melt; then if the pressure is released, it may freeze again into an ice ball.

That water expands when it freezes is shown by the fact that ice floats. Its increase in volume is about one eleventh. For this reason, water pipes often burst if they are allowed to freeze when filled; also, water in pores and cracks of rocks freezes and breaks up the rocks into soil. It is very fortunate that ice is lighter than water, for otherwise many of our lakes would freeze solid to the bottom. Instead, the ice on the surface protects the water beneath so that it does not cool so fast, and if a lake is fairly deep it may have water below the ice throughout the winter.

Salt water requires a colder temperature for freezing: 27°F., in fact. When such water freezes it tends to exclude the salt, so that the ice is nearly fresh. In the same way many of the impurities in lake water are forced out of the freezing water, but some remain, so that lake ice is not necessarily free of germs or dirt, though purer than the water.

The harvesting of natural ice for refrigerating purposes is an important seasonal industry in the Northern United States and in Canada. When streams and lakes freeze to a suitable depth, crews take their machinery out on the ice, scrape off surface snow and weathered ice, then mark and saw out a large field in great blocks. These are floated to the foot of the icehouse intake, where a chain-driven flight conveyor carries them up to the proper floor of the heavily insulated storage building at the edge of the water. This icehouse is usually equipped with a railroad siding to facilitate bulk shipments of ice to convenient



Official Coast Guard Photo

GLITTERING MENACE OF THE SEAWAYS

As the diagram shows, most of an iceberg is under water, completely hidden from view.

markets. Small icehouses harvest and store ice in the same manner, distributing it to their communities by truck.

In the larger cities and in warm regions where natural ice cannot be harvested, it is artificially made. For food-refrigerating purposes, distilled water is used. Freezing is economically accomplished by placing containers of water in brine which is cooled below the freezing point of water by the expansion of ammonia gas in a system of pipes. Much perishable merchandise is now preserved during shipment by *dry ice,* which is carbon dioxide solidified under pressure. In normal air temperatures, it changes back to a gas, creating cold as low as —200°. Dry ice is so cold that it "burns the skin" on contact. All artificial refrigerating devices operate on this same principle; that is, the absorption of heat by solids reverting to liquids or by liquids expanding into gases.

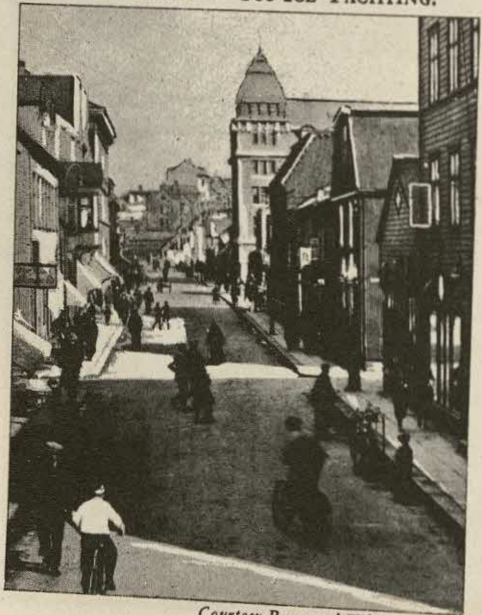
The growing practice of refrigerating foods at their source, for shipment to and storage at distant markets, has built up a great network of refrigerated railway, motor-truck, and boat services, cold-storage warehouses, and refrigerated retail-display fixtures. Refrigerated carriers, other than ships, usually rely on shaved ice or dry ice, while cold-storage systems are commonly provided with mechanical refrigerating systems using ammonia or other chemical refrigerants. A great many homes, hotels, and restaurants are now fitted with electric- or gas-powered-unit refrigerators which offer severe competition to natural- and artificial-ice businesses. See COLD STORAGE.

ICE'BERGS. Glaciers flowing down their valleys in cold regions may finally reach the sea, where parts break off and drift away. Sometimes these detached blocks of ice are enormous—large enough to cover a square mile 500 feet deep—but most of them are not this large. Since only a small part (about one seventh) of an ice block appears above water, icebergs look much smaller than they really are. The largest icebergs are those which break off the great ice barriers in the Antarctic Ocean, but these are not a menace to commerce, since they are less in the path of ocean vessels than those in the Northern Hemisphere.

Those in the North Atlantic come chiefly from the Humboldt Glacier in Greenland, which extends along the coast for sixty miles. These icebergs are such a menace to ships that in the spring, when they are most numerous, vessels take a more southerly course between Europe and America. It was because it followed too northerly a course that the *Titanic* encountered one of these bergs near Newfoundland in April, 1912, sinking with over 1,500 people on board. Since icebergs are usually enveloped in dense fog, it is very difficult to detect their approach, but by means of a very sensitive thermometer, ship captains are aware when one is in the neighborhood. As the bergs drift into warm equatorial waters, they melt and disappear.

The *Titanic* disaster resulted in the formation of the international Iceberg Patrol, financed mutually by the great shipping nations of the North Atlantic and maintained by vessels of the United States Coast Guard. These ships keep in touch with bergs which threaten to obstruct shipping lanes and broadcast warnings to all vessels using the northern routes. See COAST GUARD.

ICE BOATING. See ICE YACHTING.



Courtesy Raymond-Whitcomb, Inc.

ARCTIC METROPOLIS

Reykjavik, capital of Iceland, is by no means an explorer's camp. Its population is 30,000.

ICE'LAND. Just touching the Arctic Circle about 500 miles northwest of Scotland is the little island of Iceland, one of the world's most remote, but most beautiful, spots. Greatly misnamed, Iceland is no more "icy" than Greenland is "green." As a matter of fact, its climate is temperate throughout much of the year, and its air is unrivaled for visibility. Formerly owned by Denmark, Iceland is now an independent nation.

Geography. The island covers 39,709 square miles and has a population of about 170,000. Though located as far north as Fairbanks, Alaska, its temperature in the winter hovers around 30°F.; in the summer it rises to about 50°. The climate is not so cold as it is raw, the chilly summers being caused by ice masses drifting by on their way from the Polar regions. Much of the island is taken up by mountains, hills, and glaciers. Along the coast, craggy precipices rise almost perpendicularly from the sea, forming beautiful fiords that rival those of Norway. Here, too, may be found great glaciers like those in Switzerland, volcanoes and grottoes equaling those of Italy, and steaming geysers that match those of New Zealand or Yellowstone Park in the United States. Mineral springs similar to those in Germany and one of the world's largest waterfalls help make Iceland a real paradise for the tourist.

Occupations. Because so much of the land is broken by mountains, Icelanders

Courtesy Raymond-Whitcomb, Inc.

WELL-STARCHED ICELANDERS

The immaculate white waists are characteristic Icelandic costumes. Unmarried girls wear caps.

HARDY NORSEMEN CLAIM ICELAND FOR THEIR OWN
The little Arctic island was entirely uninhabited when the Norse first colonized it. Their descendants have turned the bleak land into a thriving, modern community.

make little attempt at farming but rely on the raising of sheep, cattle, and horses to furnish their chief exports. These, together with vast amounts of fish, are traded in Europe and America for necessities.

Education. Iceland leads the world in literacy, for everyone on the island can read and write. Schools, however, are scarce, much of the education being carried on at home. The literature of the Icelanders dates back to the twelfth century.

History. The island was discovered by Norsemen in the ninth century. In 930 a Constitution was adopted, which provided for a yearly assembly, forerunner of the present Althing. This legislative body is considered the oldest Parliament in the world. Iceland merged with Norway in 1263, and the two countries came under Danish rule in 1380. Iceland remained a part of Denmark after the separation of Norway from the kingdom, in 1815.

Iceland was granted her independence in 1918, but continued to acknowledge the sovereignty of the Danish king until Germany invaded Denmark in 1940; in May, 1941, Iceland announced her independence. The new republic was officially proclaimed on June 17, 1944, with Sveinn Bjornsson as her first President.

ICELAND SPAR. A pencil placed under a piece of Iceland spar, a transparent mineral, will appear double because of the double refraction of light through the mineral. Double refraction occurs because Iceland spar breaks into two beams, breaking the entering light; thus the observer sees two objects. Iceland spar is a form of calcite and has rhombus-shaped crystals. See Polarization of Light.

FAST AS THE WIND!
Ice yachts sometimes attain speeds of seventy miles an hour; they require skillful handling. This pilot is out on the rigger to balance the "heel" of his wind-driven racing craft.

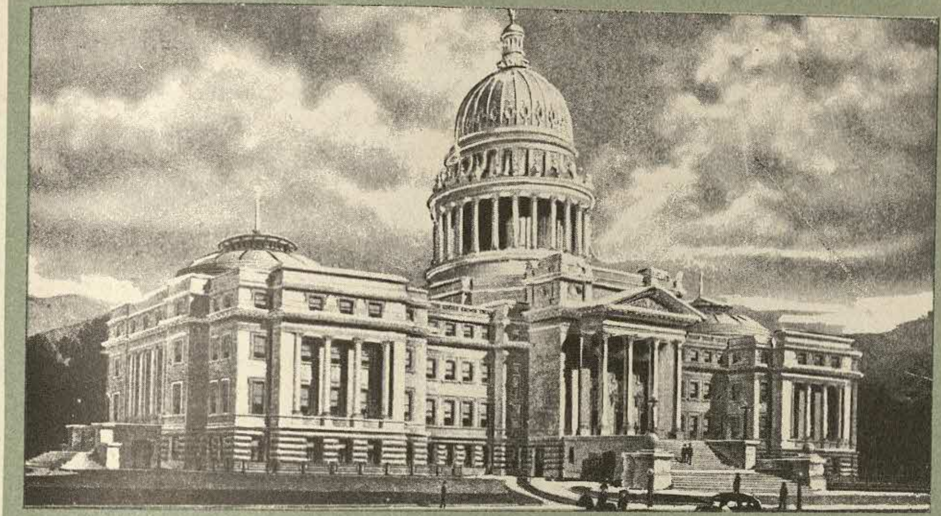
ICE YACHTING, *yot′ing.* Combining the joy of moving without motor and the excitement of speed, ice yachting is a winter sport that has few equals for thrills. Smooth steel runners gliding over a frozen lake with the craft tilting dangerously to leeward; tears filling your eyes and wind stinging your face, as landmarks pass as quickly as if in a dream, are sensations not soon forgotten.

Ice yachts, because of their unique construction, can travel faster than the wind. Speeds of from forty to seventy miles an hour are not unusual, and a race between two skillful pilots is an exhilarating contest. Originating in the northern part of the United States and in Canada in the eighteenth century, the sport has become popular at the major winter resorts where there are fairly large bodies of water. Competitions are held each winter, and prizes are awarded.

The yacht is of comparatively simple design, consisting of a compartment for pilot and passengers placed atop an open framework. One bar, running lengthwise, may have a single runner at the rear, or a single runner in front and two in the rear. The single runner serves as a rudder. A crossbar at right angles to the lengthwise bar has two runners, one at each end. The yacht has a tall mast and a large sail. In some cases, a jib sail also is used.

Maneuvering the ice yacht requires a great deal of skill, for the "boat" responds to the wind much more suddenly than does a sailboat. Frequently a sudden gust of wind causes a spill while the yacht is traveling at a high speed, unless the pilot is quick at the "stick." Ice yachting has become a favorite sport among northern sailboat enthusiasts as a means of continuing their interest in sailing through the winter.

ICHTHYOSAURUS, *iḳ thi o saw′rus.* A huge, prehistoric sea animal, the ichthyosaurus was characterized by four paddle-like fins used in swimming and by a long, narrow snout filled with two rows of sharp teeth. Its vertebrae were similar to those of a fish. With a short-necked, tapering body which was sometimes thirty feet in length, this sea reptile was rather common in certain parts of Europe. Skeletons of some thirty-five species have been found in the East Indies, England, South America, Australia, and New Zealand.



MASSIVE GRANDEUR CHARACTERIZES IDAHO'S CAPITOL
The stately capitol at Boise, Ida. Admitted to the Union in 1890, Idaho ranks thirteenth in area and forty-second in population in the United States.

I'DAHO. Called the "Gem of the Mountains" by the Shoshone Indians, Idaho is well named, for it is indeed rich in natural resources and products. Bounded on the west by Washington and Oregon, on the south by Nevada and Utah, on the east by Wyoming and Montana, and on its northern tip by Canada, its area is 83,557 square miles. The population of the state is about 670,000, an average of about 8.1 persons per square mile.

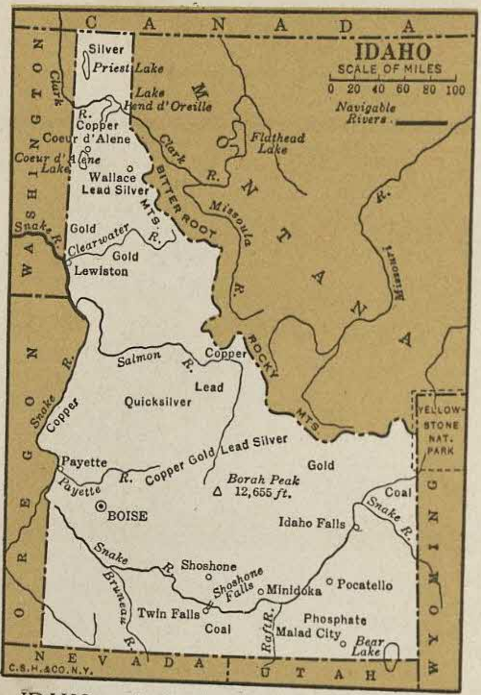
Idaho's Rugged Surface. Idaho is a state with many mountains. Along most of its eastern border extend the Coeur d' Alene and Bitter Root mountains, prominent sections of the continental divide. The Caribou Range, a part of the Rockies, stands guard near the Wyoming border. Through the central part of the state run the famous Sawtooth Mountains.

Although Idaho has an average altitude of 5,000 feet, much of its area is taken up by broad, fertile plateaus. The largest and most productive of these is the Snake River Valley. Here, fertile volcanic-ash soil yields record crops when irrigated, helping to make agriculture the state's leading industry. Famous "Idaho potatoes" grow here.

Besides the Snake, the state is drained by the Salmon and the Clearwater in the north-central part and, farther north, by the Kootenai, a Columbia tributary, and the Clark Fork. The southwestern corner of the state is watered by the Bear River, which empties into the Salt Lake Basin.

Gaping craters of extinct volcanoes, lava rivers, mountains of granite, deep canyons, grassy prairies, crystal lakes, deep forests, and sheltered valleys all extend to the tourist an invitation to spend his vacations in Idaho. Sun Valley, near Ketcham, is the state's famed ski and swimming resort.

Climate and Resources. Idaho's slopes are always cool; in the winters they are snow-covered and swept with biting breezes from Canada. In the valleys, however, one seldom meets with temperatures below zero, even in the dead of winter; while in the summer the temperature in these protected areas may exceed 90° F. In many of these valleys, cattle can graze all winter. Rainfall in the southern part of the state is so scant that it is necessary to resort to irrigation and dry farming; while in the north, the winds from the Pacific drop an abundance of moisture when they come



IDAHO — A MINERAL-RICH STATE
A large producer of lead, Idaho also abounds in silver, gold, copper, and other minerals.

in contact with the mountains.

Chief among the natural resources of the state are its forests and minerals. Included in the forest area are about 2,000,000 acres of white pine, said to be the finest in the United States. In all, forests cover over a third of the state. Also rich in minerals, Idaho mines large amounts of lead, silver, gold, zinc, copper, and tungsten. Other minerals produced include cobalt, phosphate rock, antimony, vanadium, and various gem stones of fine quality.

Farming in Idaho. The state is roughly divided into two types of farming areas. In the north there is abundant rainfall for all growing crops, while in the southern areas farmers must resort either to irrigation or to dry farming. The famous American Falls (on the Snake) and Arrowrock and Anderson Ranch dams (on the Boise River) are only a few of the state's many irrigation dams. By irrigation, Idaho's naturally arid but fertile areas are made very productive. Although best known for its huge baking potatoes, wheat is its leading crop. Others include hay, barley, oats, sugar beets, peas, berries, melons, garden seeds, vegetables, and fruits such as apples, peaches, and prunes. Idaho's year-round grazing facilities make the raising of sheep, dairy and beef cattle, hogs, horses, and poultry very important. It ranks high in wool and lamb production.

Manufacturing. Idaho's manufacturing is based on its lumbering and farming and is encouraged by its abundance of water power. Its most valuable products come from its sawmills, veneer plants, and cooperage-stock mills, and one of the world's largest lumber mills is in Lewiston. Other industries include sugar-beet refining, flour milling, fruit and vegetable canning or drying, and cheese and butter processing. The Federal Government maintains a number of atomic projects in the state.

Transportation. Since 1915, the Celilo Canal on the Columbia has connected Lewiston with the Pacific, making it a port although it lies 480 miles inland. Freight and passenger vessels also ply the Kootenai, between Bonners Ferry and Nelson, in British Columbia. Idaho has good rail and air service and thousands of miles of improved roads.

Government and Education. The chief executive of the state is the governor, who is elected for a four-year term. The legislature consists of two houses, the senate and house of representatives. All members hold office for two years. The supreme court of the state consists of five judges elected to serve six years each. The constitution of the state, adopted in 1889, though progressive and modern, is sound and by no means radical. One of the most progressive steps taken by the state government occurred in 1919, when fifty-one old bureaus, departments, and boards were eliminated and their work taken over by nine newly created administrative departments.

Chief among the fine educational institutions of the state is the University of Idaho at Moscow. In addition to the many elementary and high schools of the state are

Union Pacific Railway Photo

FABULOUS SUN VALLEY IS IDAHO'S RICHEST RESORT

Situated in a huge bowl in the Sawtooth Mountains of Idaho, Sun Valley attracts tourists from all over the world for both summer and winter sports and relaxation.

the Idaho State College at Pocatello, the State School for the Deaf and Blind at Gooding, and the Idaho Industrial Training School at Saint Anthony. In control of the entire educational system, from elementary schools through the state university, is the State Board of Education and Board of Regents of the University.

Idaho's Colorful History. The history of the state dates back to 1805, when Lewis and Clark first entered this area. Four years later, the British North West Fur Company established a post called Kullyspell House on Lake Pend d'Oreille. A year later, Fort Henry, near the present Saint Anthony, was founded by Andrew Henry of the Missouri Fur Company. In 1812 came the Hudson's Bay Company, which, in spite of competition, held a virtual fur monopoly until 1856.

In 1846 Great Britain relinquished all claim to Oregon in favor of the United States. About this time fur trading began to decline in Idaho. Although the Hudson's Bay Company was allowed to keep its possessions here, fur trading became so unprofitable that the claims were abandoned in 1856. In the meantime, a number of missions had been established in Idaho by the Catholics, Presbyterians, and Mormons. Idaho was admitted to the Union as a territory in 1863, becoming a full-fledged state in 1890. See BOISE; DRY FARMING; LEWIS AND CLARK EXPEDITION.

IDOL. See Image Worship.

IDYL, or IDYLL. A short poem describing all the details of a particular subject or event is called an idyl. It must allow the reader to see a complete picture of the scene or subject described. A highly descriptive poem like John Greenleaf Whittier's *Barefoot Boy* is an example of an idyl. Although an idyl is generally about simple, quiet, everyday life, it may be on any other subject. Tennyson called his great poem of life at King Arthur's court *Idylls of the King*.

IGNA'TIUS OF LOYOLA. See Loyola, Ignatius of.

IGNEOUS, *ig'ne us,* **ROCKS.** Solidifying from original molten material, igneous rocks are like the lava that hardens after issuing from volcanoes. Lava on the surface cools in a fairly short time to a dark, glassy mass. The great parent mass is not exposed and so cools very slowly, crystallizing as it does so.

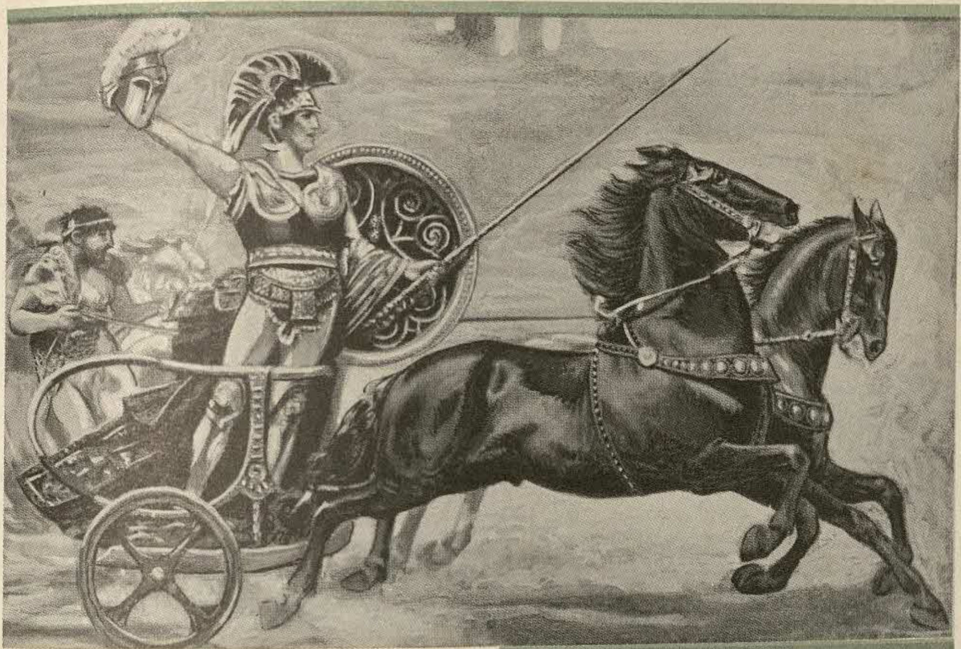
Forms of Igneous Rock Bodies. Because they solidify from a molten condition, igneous rocks take a great variety of forms. When they come out at the surface as lava, they flow down valleys as lava streams, or spread out in thin sheets on flats. The surface of these flows is often rough and ropy, from the cooling of the rock as it flows. If the molten rock is driven out of the volcano by a great explosion, it is blown to bits and comes down as fine powder, or as pellets, or large, round pieces, called *volcanic bombs*. Pumice is developed when the molten rock is blown full of steam or gas bubbles. It is of these forms of igneous rock that volcanic cones are built.

Within the earth the molten rock fills the vertical or nearly vertical cracks in the other rocks, and the solid masses resulting are called *dikes*. When it squeezes in as a thin sheet between flat beds, it is called a *sill*. If the sill becomes a thick lenslike shape, it is a *laccolite* (or *laccolith*). All these forms are characteristic of the outer fringe of the main igneous mass. The main mass is called a *batholite*. See Earth; Geology; Gneiss; Granite.

DINOSAUR IN MINIATURE
Sharp teeth and a whiplike tail protect this denizen of America's southwestern deserts.

IGUANA, *ig wah'nah.* Although it has a forbidding appearance, the iguana lizard is timid and harmless. Native to Southwestern United States, Mexico, and Central and South America, it is usually about four feet long with greenish scales. It is distinguished by a ridge of sharp spines which extend the length of its back. When threatened, the iguana makes for water where it can stay under the surface for several minutes. Sharp claws aid it in climbing trees, where it lives and lays its eggs. Its principal foods are fruits and fungi, but many varieties are helpful in destroying insects harmful to crops. The *alligator lizard* is sometimes found farther north.

IL'IAD. Stirring tale of the Trojan War, of Achilles, and the long struggle in which the gods sided with Greece or Troy, the *Iliad* is recognized by many as the greatest epic poem of ancient times. Its authorship is credited to Homer, but no one has ever proved beyond doubt whether the *Iliad* was an original poem by him or merely a collection of many old folk tales.



HER BEAUTY DESTROYED PROUD TROY

As recounted in Homer's *Iliad*, Achilles (above) led the Greeks against Troy to avenge Paris' abduction of the beauteous Helen (right).

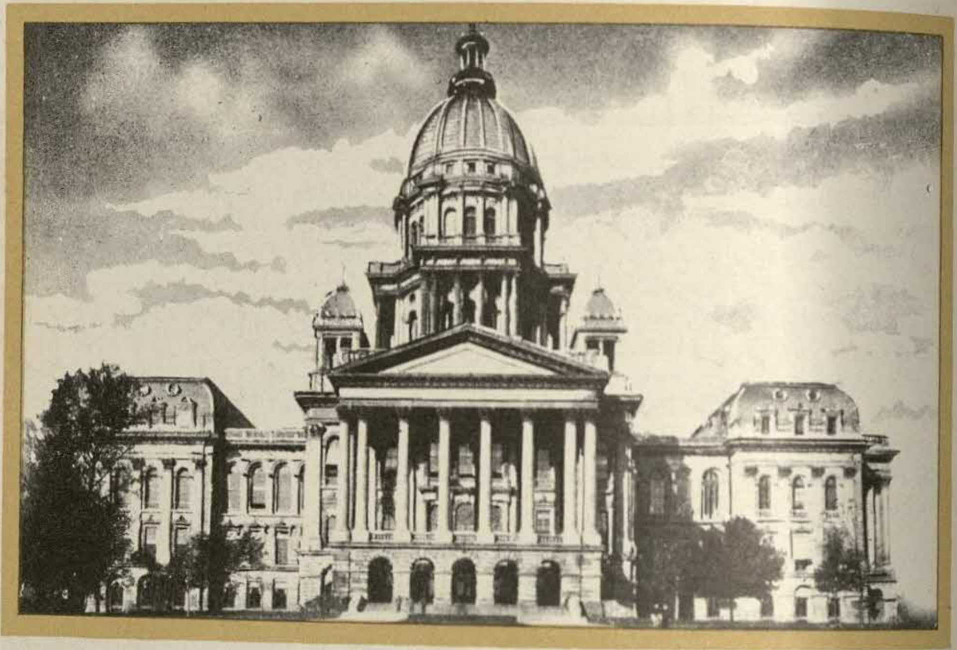
Some scholars even doubt that such a man as Homer ever existed.

Events leading up to the story told in the *Iliad* include the kidnaping of the beautiful Helen, wife of King Menelaus of Sparta. She was carried off to Troy by Paris; and to save her, King Agamemnon of Mycenae, brother of Menelaus, led a Greek army to the walls of Troy and besieged the city for about ten years. But the Trojans, fearing the Greek hero, Achilles, would not offer battle and stayed within their walls until Achilles withdrew, angered because Agamemnon had taken one of his slaves.

Here the *Iliad* takes up the chronicle, with the wrath of Achilles and its consequences. Of the twenty-four books in the *Iliad,* fifteen concern the Trojan War. The army of Troy ventured out when Achilles retired, only to flee in terror when Patroclus, friend of Achilles, advanced wearing the armor borrowed from the hero. Throughout the war, however, the gods took part—Ares, Apollo, and Aphrodite for the Trojans; Hera, Athena, and others for the Greeks. And at this juncture Apollo put Patroclus into a stupor, and Patroclus was killed by Hector. The death of his friend brought Achilles back to battle seeking vengeance, girded by a new suit of armor Hephaestus made for him; he slew Hector and dragged the body behind his chariot. But King Priam begged Achilles to give him his son's body, and Hector was buried as befitted the son of a King. See HECTOR; HELEN; HOMER; TROY.

IL'ION. See TROY.

IL'IUM. See TROY.



Pictures, courtesy Illinois Journal of Commerce

THE ILLINOIS CAPITOL REFLECTS THE SPIRIT OF THE STATE
The capitol at Springfield. Illinois was admitted to the Union in 1818, and boasts some of the world's most important manufacturing and agricultural areas.

ILLINOIS, *il i noi'*, or *il i noiz'*. Land of gently flowing rivers and broad, fertile plains, steeped in the legends of Indians and the early French fur traders, Illinois lies in the heart of the most productive region in the United States. Abundantly supplied with rich farm lands and large mineral deposits, the "Prairie State" is also the center of the nation's vast network of railroads. From Chicago, its largest city, people and goods are carried to the four corners of the continent.

Illinois is noted, too, for the scenic beauty of its great prairies, its wooded slopes, and its winding streams and rivers. Many historical spots attract the traveler, such as the famous Starved Rock on the Illinois River and the huge statue of Black Hawk on the Rock River. Within this area of 56,400 square miles live about 10,100,000 people, more than half of whom are congregated in the vast metropolitan area of Chicago and its environs.

The Land and Rivers. Lying in the central plains region of the Middle West, Illinois is a broad plain that gently slopes from northeast to southwest. The central region is flat, and its rich glaciated soil is among the most productive in the United States. The southern section of the state, however, is crossed by the foothills of the Ozark Mountains. Here are many hills and deep valleys that also contain fertile farm lands.

The most important river within the state is the Illinois, which reaches almost from Chicago to the Mississippi. The Mississippi forms the state's western boundary; the Ohio, its southern border; and the Wabash, its southeastern boundary. Freight can be shipped by barge from Chicago, on Lake Michigan, to New Orleans by way of the Illinois Waterway, including a Chicago canal and the Des Plaines, Illinois and Mississippi rivers. This route, known as the Great Lakes-to-Gulf Waterway, joins the Saint Lawrence Waterway system to the Gulf of Mexico.

The Illinois is formed by the union of the Des Plaines, flowing from the north, and the Kankakee, flowing from the south.

Other important streams are the Fox, which joins the Illinois at Ottawa; the Sangamon, and the Kaskaskia. Flowing across the northwest corner of the state is the great Rock River, which joins with the Mississippi at Rock Island.

Climate. Like most regions lying in the middle of a large continent, Illinois has frequent and sudden changes of weather. In the winter there are several cold waves, and extremely high temperatures at short intervals occur during the summer. Because of the length of the state there is a marked difference between the climates of the northern and southern portions, the temperature averaging ten degrees cooler in the north than in the south. Rainfall and snow give the state an average precipitation of over thirty inches yearly.

Products of the Soil and Mines. Lying in the productive Corn Belt region, Illinois, with its favorable climate and fertile land, is one of the leading agricultural states. As in most of the surrounding states, corn is the chief agricultural product. Illinois and Iowa are the two leading states in the size of the corn crop, alternating as first or second. Much of the corn raised in Illinois is shipped to other parts of the country and even to foreign markets, through Chicago, the world's greatest corn port. Illinois leads the nation in the production of soybeans and has more arable land than any other state, some 88 per cent of its area being in farms. Fruits, such as peaches, apples, pears, and grapes, are extensively grown, as are berries, melons, and vegetables. Other important crops include wheat, oats, barley, rye, hay, potatoes, and buckwheat. Even cotton, tobacco, peanuts, tung nuts, and pecans are grown in the south. Illinois' livestock industry includes dairying and the raising of large numbers of hogs, sheep, beef cattle, and poultry.

Illinois has become one of the most important states not only because of its central location and fertile farm lands, but also because of its large deposits of valuable mineral resources, of which coal is the most important. Almost two thirds of the state is underlain by great deposits of bituminous

Deere & Company

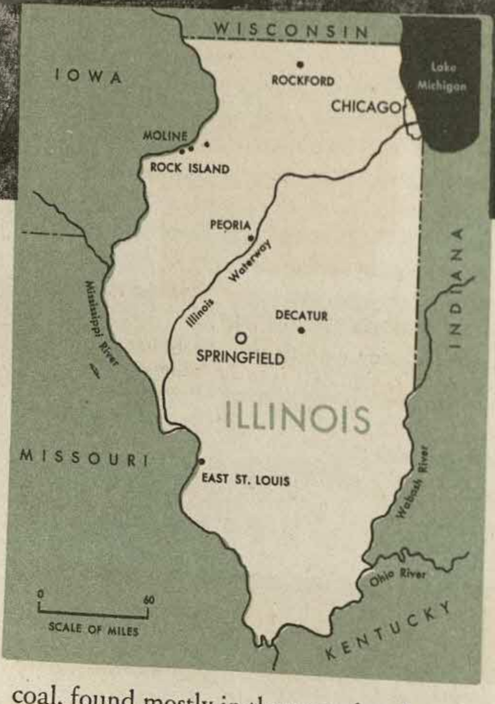
THE FLAT AND FERTILE FARMLAND OF ILLINOIS

Vast fields of grain and other crops stretch to the horizon in Illinois, which has been a leader in agricultural progress in America since the days of the pioneer.

Illinois Highways Division

QUIET BEAUTY, SCENIC CHARM

Illinois has more to offer than bustling cities and busy farms. Here is a delightful scene on the Illinois River, not far from its entrance into the great Mississippi.



coal, found mostly in the central and southern portions. Large deposits of petroleum and natural gas are also found in the southeastern section. Other leading mineral products include limestone, lead, molding and glass sands, tripoli, fluorspar, gravel, tile-and-brick clays, pyrites, and zinc.

Manufacturing and Trade. Illinois has become the third largest manufacturing state in the Union because of its central location, which gives it access to all important markets in the United States; its outstanding transportation facilities, which lead to all parts of the country; and its rich agricultural and mineral resources. The manufactures include railway cars, electrical equipment, animal and vegetable fats and oils, clothing, watches, clocks, stoves, furnaces, furniture, farm and road machinery, glass, cement, and liquors. Its leading industrial center is Chicago, the world's largest slaughtering and meat-packing city, with thousands of factories turning out countless products and some of the country's largest iron-and-steel mills. Yet East St. Louis, Granite City, Decatur, Alton, Joliet, Elgin, Pullman, Moline, East Moline, Rock Island, and Springfield are only a few of the state's other outstanding industrial centers. Publishing, printing, canning, and flour milling are also important.

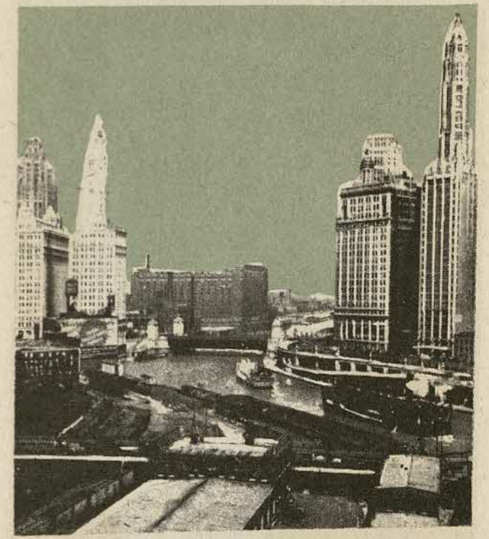
Chicago is the hub of the nation's railroad system, and many trunk lines have their terminals here. Crossing the state are the tracks of all the important roads that lead to the West, and Texas is the only state having a greater railway mileage. Illinois is also served by a fine network of major airlines and has many important airports and air bases.

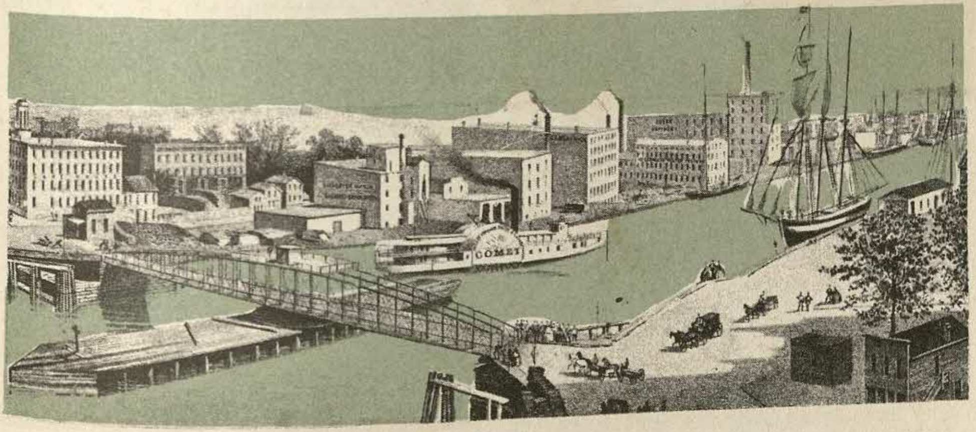
The rivers of the state also form important means of transportation and communication; while Lake Michigan provides port cities with cheap water routes to other Great Lake ports and, through the Saint Lawrence Waterway, to seaports all over the world. Much money has been spent on the roads of Illinois, and the state has one of the most modern highway systems in the United States.

The People. Although agriculture is the state's leading industry, well over three fourths of its people live in its cities and towns. Bustling Chicago is its greatest center of population, and more people live here than in all the rest of the state. Peoria ranks second in population, and is followed by Rockford, East Saint Louis, and Springfield, the capital.

The governor of the state, the lieutenant-governor and the other state officers are elected for terms of four years, with the exception of the treasurer, who holds office only for two years and may not be reelected for the succeeding term. The house of representatives is composed of 153 members, each of whom is elected for a two-year term. Senators are elected for a four-year term, but the terms of about half the senators expire every two years. Three representatives and one senator are chosen from each of the fifty-one senatorial districts.

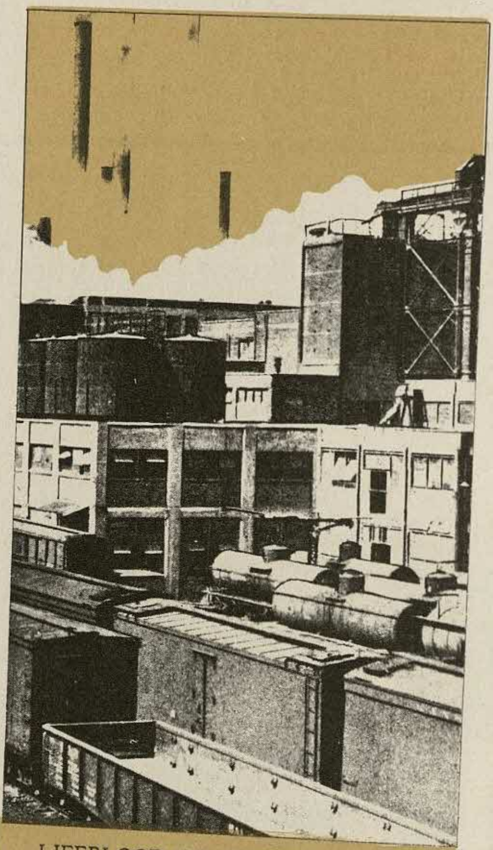
The "Prairie State" has thousands of public and private schools, including primary schools and community and township high schools. Institutions of higher education include the University of Illinois at Urbana and Chicago and a number of state





CHICAGO—FROM VILLAGE TO METROPOLIS

The growth of Chicago from a minor trading post to a vast city is typified in these scenes of the Chicago River.



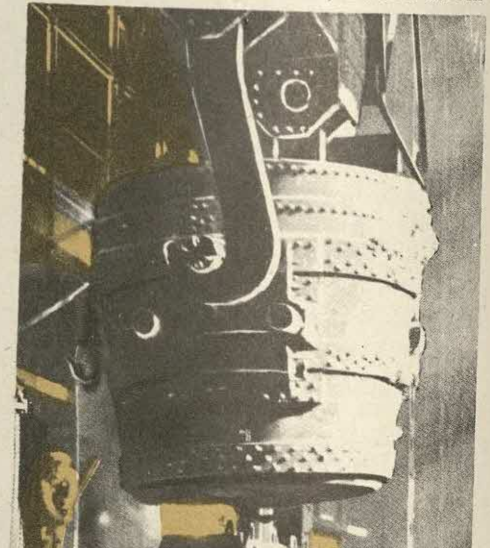
LIFEBLOOD OF ILLINOIS TRADE
Great factories, served by a tremendous network of rails, convert the state's many and varied raw materials into goods.

teachers' colleges. Among the privately endowed institutions of higher learning are the University of Chicago; Illinois Institute of Technology; Northwestern, Bradley, De Paul, James Millikin, Loyola, and Illinois Wesleyan universities; and Roosevelt, Knox, Rockford, Augustana, Wheaton, Monmouth, and North Central colleges.

History. Only seven years after Father Marquette and Louis Joliet explored Illinois in 1673, La Salle built the first French fort on the Illinois River, Fort Crèvecoeur, near Peoria. It was the first white settlement in the state, but it was soon followed by Fort Saint Louis on Starved Rock. As the French came to this region in increasing numbers because of the fur trade, other settlements were begun.

At the close of the Revolutionary War, Illinois was claimed by Virginia, but was ceded to the Federal government in 1786 and became a part of the Northwest Territory. It was part of the Territory of Indiana from 1800 to 1809, when it became a separate territory. In 1818 it was admitted as the twenty-first state of the union.

Up to the time Illinois came under control of the Federal government, few permanent settlements had been made. However, by 1800 people from Tennessee and Kentucky had taken up farm lands in the southern part of the state. It was not until the completion of the Erie Canal in 1825 that Northern Illinois was extensively settled. At this time many people from New England, traveling by way of the canal and the Great Lakes, landed at Chi-



STEEL—AN INDUSTRIAL GIANT
Flaming steel mills glowing against the sky advertise a front-rank Illinois industry.

cago, and spread in fanlike fashion throughout the prairies of the North. Chicago soon became the shipping point for the products of Illinois farms, and in order to provide cheap transportation to the city, the Illinois Michigan Canal was built. The Federal government made large grants of land to the railroads, and in 1850 work was begun on the Illinois Central.

Illinois came into national prominence in 1860, when its famous son, Abraham Lincoln, became President of the United States. Since that time the state has had increasing prosperity and importance. Chicago was swept by fire in 1871, only to rise from its ashes to become the second largest city in the United States. In this city were held two of the greatest world's fairs—one in 1893, in celebration of the 400th anniversary of the discovery of America; and one in 1933, the Century of Progress. See BLACK HAWK; CHICAGO; JOLIET, LOUIS.

ILLINOIS. Four great Midwestern states now compose the former domain of the powerful and warlike Illinois Indian tribes. Centered in the area which became a state named after them, they spread northeast into Michigan and west into Iowa and Missouri. The Illinois, related to the Algonquins, were friendly to the French, and aided them materially in the French and Indian Wars. Following the War of 1812, they were a menace to the United States for a number of years.

ILLIT'ERACY. Generally speaking, a person who can neither read nor write in any language is termed illiterate. For purposes of the United States census, however, a person is classified as illiterate if he is fourteen years old or more and cannot read and write in any language.

It is difficult for most of us to imagine what it means to be illiterate. All that a person gets from books, papers, magazines, and even the letters of his friends, would be lost unless he could find a friend to read for him. And then he would have to depend entirely on his memory to bring to mind again a lovely poem or song or an entertaining story. An acquaintance moved to another town would be lost as though he were dead, for one could not write of all the things which were happening.

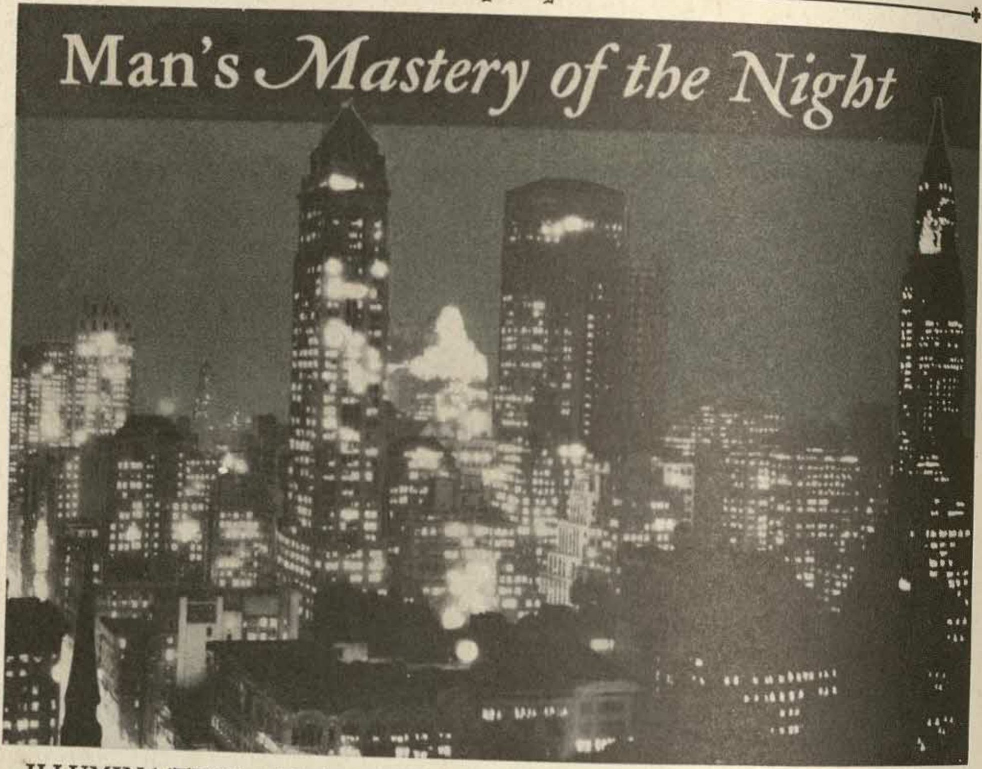
Why There Is Illiteracy. At one time, illiteracy was almost unavoidable because of lack of public schools, and only a few were fortunate enough to read and write. Today in most countries there is little excuse for such conditions. In cities of the United States illiteracy is found mostly among foreign-born and Negro adults who may have come from backward nations or from rural areas in the South where educational facilities for Negroes have long been neglected.

Trends Toward Literacy. A capable, representative, democratic government must have citizens who are able to take an intelligent part in the government—to voice opinions and to make objections to legislation. If illiterates are allowed to vote, governments endanger their own stability. If they are not permitted to vote, they are denied a voice in making laws which directly affect them. Every democratic government therefore tries to put an education within the reach of every citizen.

In the census of 1880, seventeen per cent (one sixth) of the people in the United States were illiterate (unable to write any language). By mid-century the figures had fallen below 3 per cent. In contrast to these figures are those of the United States Army showing that one out of four drafted in 1917-18 could not read or write *English.* Increased public and private schools and laws providing for compulsory education in city and country are rapidly reducing illiteracy in youth, and in many cities night schools at little or no cost are being made available to natives and foreign adults, not only for learning how to read and write, but for gaining the essentials of government, mathematics, and literature, and any other subject in which they may be interested.

Statistics of the illiteracy of nations and of large cities and states of the United States may be found in any almanac of the world. See CITIZEN; EDUCATION.

Man's *Mastery of the Night*

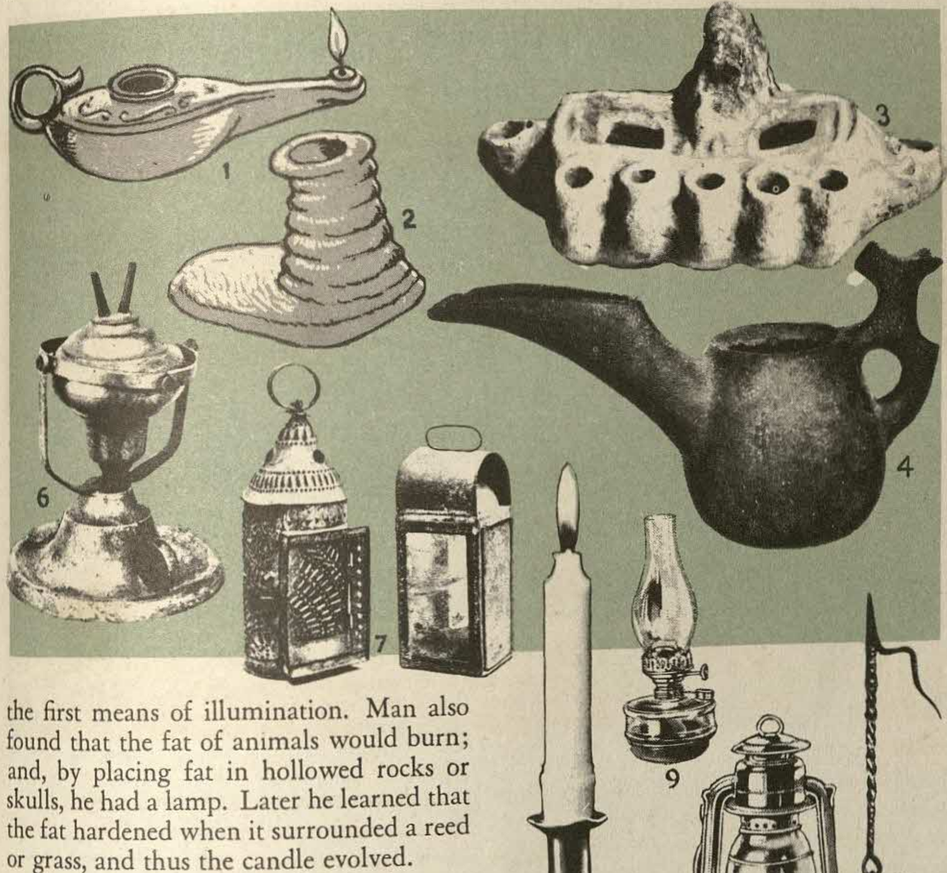


ILLUMINA'TION. Night no longer holds fears for man. It is no longer a time when he must stop work, sit in darkness, and cease all activity simply because the sun has gone down. Night has been changed into a period of activity because of artificial illumination, and throughout man's history the search for better illumination has gone forward to make night more and more like day.

Today we use artificial light for many purposes. In the home we are able to read and entertain; work can go on in factories and shops and stores; street lights protect us against the dangers that lurk in the dark; stop-and-go lights, airplane beacons, lighthouses, and floodlighted landing fields add to the safety of transportation systems. Because of illumination, we are able to enjoy moving pictures and plays and to watch night athletic events. Illumination increased our wealth because of more time to produce and distribute goods; in general, it has made life more interesting.

Man first sought light because of fear. Danger lurked in the darkness—danger from wild animals, human enemies, and the evil spirits he thought existed. Light would drive away these dangers. After he had crude forms of lighting, man improved his methods of illumination because his activities were becoming more varied. The reading of books, brought about by printing, for instance, necessitated stronger light than that afforded by a single candle; so candlesticks for many candles were devised. Entertainment at night was desired; so chandeliers, spotlights, and floodlights were devised. Man found he had to work at night; so he wished bright, steady light that would not hurt his eyes. Advancement in transportation facilities necessitated a parallel advancement in illumination.

The story of how man met these requirements is the story of illumination. Prehistoric man found that fire was one way of having light. He found that he could wander out at night and see by carrying a lighted stick. Thus the torch was one of



CENTURIES OF SHADOW CHASING
History records a perpetual struggle against the encircling gloom of night. Until the nineteenth century, oil was the only source of illumination, whether contained in candles or some kind of lamp. (1) Oil lamp of early Rome. (2) Babylonian lamp made of coiled clay. (3) Seven-wicked oil lamp found in Mesopotamia. (4) Long-spouted Cretan lamp. (5) A so-called "Betty" lamp of the seventeenth century. (6) Pewter whale-oil lamp, about 1800. (7) Two late eighteenth-century lanterns. (8) The time-honored kerosene lantern. (9) Chimneyed kerosene lamp. (10) The age-old candle.

the first means of illumination. Man also found that the fat of animals would burn; and, by placing fat in hollowed rocks or skulls, he had a lamp. Later he learned that the fat hardened when it surrounded a reed or grass, and thus the candle evolved.

A great step forward in illumination was made with the Betty lamp, a device that had a wick in the nose, or snout. This was the first lamp in America, for the Pilgrims brought it with them. Fish oil and then whale oil were used for fuel.

Life became brighter for mankind when gas came into use for illumination. For many years people had noticed "bubbling water" emerging from the ground, but they feared it. In 1792 William Murdock of England equipped his home with a supply of this gas, burned it for light, and became the first person to make practical use of gas. In 1817 the city of Baltimore installed a system of street lighting by gas, becoming the first American city to have gas illumination.

Improvements were going forward in lamps during this time. The Argand lamp, consisting of two tubes, one inside the other,

PARTIES HAVE ALWAYS MEANT LIGHTS
Even if the illumination was a flickering pitch brand. Above, wassail in medieval England. Left, decorative iron lantern from Spain. Right, a beautifully wrought Italian iron candelabrum a century old.

Today's festive occasions are staged in the brilliance of glowing electric light, usually beneath great crystal chandeliers like this.

with a woven wick in between, gave the best lamplight for many years, especially when enclosed in a glass chimney. Sir Humphry Davy invented the safety lamp for miners in 1816, and seventy years later, Carl von Welsbach invented the gas mantle.

Just before the American Civil War the whaling industry declined, and the search for a new fuel to replace whale oil was launched. In 1859 Col. E. F. Drake sank the first oil well in Titusville, Pa., and a new fuel for illumination was found; a clear liquid called kerosene was refined from the oil.

Street lighting advanced swiftly in the last quarter of the nineteenth century with the electric arc lamp. In 1799 Alessandro Volta invented the battery, and several years later Sir Humphry Davy devised a carbon arc lamp, the first electric light. This light was made practical in 1878 when Charles F. Brush perfected an arc lamp which held the carbon poles in place and moved them closer as they burned.

FASHIONS IN LIGHTING
Gas-lit chandelier in a room of the "Gay Nineties" (1); suited the room's furnishings; gave ghastly light. (2) Modern pottery jar lamp. (3) Public-building fixture. (4) Edison's first lamp. (5) Today's.

As electricity advanced, so did lighting; and finally Thomas Edison invented a light that was composed of a filament which burned brightly in a glass shell. Improvements were made in this light with the result that today the electric light is found almost everywhere.

Consult the following titles for additional information:

Candle	Kerosene
Gas, Illuminating	Light
Electric Light	Matches

IM'AGE WORSHIP. Simplest of all religions is the worship of idols. It was the type of religion prehistoric man acknowledged and was the basis of spiritual belief in the earliest civilizations. Image worship exists today in some Asiatic and African countries just as it did thousands of years ago; and frequently the Western World is shown the magnificent, multijeweled idols that are worth fortunes because of the precious gems embedded in them.

The adoration of idols probably originated in man's fear and awe of the elements and natural phenomena. Thunder, lightning, rain, clouds, the sun, the moon, stars, the sea, and rivers were mysteries to early man, and he believed they must be controlled by supernatural beings. It was only natural that he should make statues of the gods that he thought controlled these things and adopt a ritual of worship for them.

Then, as the years went on, the people forgot that such images of grotesque men and animals were only symbols, and they worshiped these idols as the gods themselves. We hear of such customs as offering food, animals, and even human beings to idols, in the belief that such sacrifices were necessary to please the gods. Although the modern, Christian world rejects such worship, it must be remembered that many of the ancient temples and works of art that tell much of man's past and enrich the beauty of the world would never have existed had it not been for image worship.

The first people to discard image worship were the Jews, and the first of the Ten Commandments specifies that the people shall not make any graven image and worship it. Much of the Old Testament deals with the conflict between the idol worshipers of Babylon, Egypt, and Persia, and the Jews who held to a spiritual belief in one God.

National Park Service

IM'MIGRATION AND EM'IGRATION. Since time immemorial, men have moved their abodes from place to place, from land to land. This moving about is called migration, and from the term we get our words *immigration* and *emigration*. Immigration is a moving into a country; emigration is a moving out of a country. Thus an Englishman coming to the United States to live emigrates from England and immigrates into the United States.

In ancient times, people usually migrated in tribes, but today it is largely the individual and his family who leave their homeland. Once food supply was the primary cause; when resources were depleted, the barbarian moved to new soil. But life has since become much more complex. Among the more important reasons for migration today are overpopulation, unemployment, religious or political oppression, the spirit of adventure, and the seeking of fame or wealth.

Immigration into the United States. With the settling of Jamestown in 1607, emigration to the United States began. Then came the Pilgrims to New England, the Quakers and Germans to Pennsylvania, the Dutch to New York, the Swedes to Delaware, and the French to Louisiana.

Between the years 1907 and 1914, all-time highs in the number of new residents were reached. Between 1820 and 1914 about 32,000,000 aliens made their homes in the United States—exceeding all other countries in the number of immigrant settlers. For the first time in the United States, in 1932 and 1933 emigration exceeded immigration, with 23,068 people being admitted in 1933 and 80,081 leaving for permanent residence elsewhere. Only a few more immigrants arrived in that peak depression year than had come in 1830. Another decline followed the start of World War II, but an upward trend began again in 1944. In 1950 more aliens were admitted to permanent residence (249,187) than in any one year since 1929.

Effect of Immigration. Europe, particularly in the Southern countries, has long been overpopulated. The abundant land in the New World at first attracted those who had sufficient savings to make the journey. These first settlers were in general the English and other northern European people. As a whole, these people were experienced in farming and in government and contributed much to the stability of the new country.

At first there was little objection to admitting and welcoming the newcomers, for the westward-expanding United States needed more people. But the rapid increase in the number of arrivals that occurred in the 1840's and 50's brought strenuous opposition to the country's policy of free immigration. Some of this came from American workers, who feared the competition of cheap labor from abroad. Other opposition sprang from religious and racial prejudices. When the source of immigration shifted from northern and western to southern and eastern Europe and more Oriental laborers arrived, opposition increased.

Many of the Italian, Russian, Polish, Balkan, and other European immigrants, as well as the Oriental ones, were poor and uneducated. Being thrifty and accustomed to a low standard of living, they were able to live more cheaply than American laborers wanted to live. Since many of the wives and children worked, too, the country's supply of labor was drastically increased, and both wages and living standards fell.

Restrictions. In 1882 Congress passed an act excluding Chinese immigration, and various other restrictions on entry into the United States have since been made. Among those excluded are the illiterate, mentally defective, anarchists, polygamists, and convicts, and those having certain diseases or likely to become public charges.

When large-scale immigration was resumed after World War I, Congress set up a quota system, under which the number of immigrants admitted annually from a foreign country should not exceed 3 per cent of that country's nationals living in the United States in 1910. Since then, quotas have been changed several times, and special laws permitted the entry of European refugees made homeless by World War II. During that conflict, restrictions against certain Orientals were lifted; then in 1952 all racial barriers were ended. Those who advocate world Communism or the establishment of a totalitarian dictatorship in the United States, and those likely to engage in espionage, sabotage, or any other subversive activity, have, however, been barred from entering the country. See CITIZEN; NATURALIZATION.

IMPEACH'MENT. When an accusation is made against an officer of the government, charging him with improper conduct, and the charge is presented by act of a legislative body, the officer is said to be impeached. The accused is not necessarily guilty of the charges preferred; if they are not substantiated in a proper trial court, he is acquitted.

In the case of an officer of the United States government, the impeachment must be voted by the House of Representatives; the Senate of the United States becomes a high court, with Senators as jurors, and the Vice-President, except when the President is impeached, as presiding officer. Should the President be impeached, the Vice-President, who would become President in case of a vacancy in the higher office, would possibly not prove an impartial trial judge. To avoid such a condition, the Constitution provides that whenever it becomes necessary to try the President, the Chief Justice of the Supreme Court shall preside. The Senate, however, is always the jury in any impeachment case. Conviction is possible only by affirmative vote of two thirds of the Senators present when the vote is taken.

An impeachment trial does not endeavor to visit a criminal penalty upon the accused if he is found guilty; the Senate's judgment cannot extend further than removal from office of the person found guilty, and the disqualification of such person to hold any office of honor, profit, or trust under the government of the United States again. The ordinary machinery of the law may thereafter be employed to bring to justice under civil or criminal laws any one removed from his office by impeachment proceedings.

In the states of the United States, the

proceeding is practically the same as in the national government. In England the House of Commons impeaches and the House of Lords tries.

IMPERIALISM, the policy of extending a country's influence beyond its own boundaries. It led to the creation of many empires. In the twentieth century, some leading powers have given up their empires, but Communist countries seek to create new ones.

A nation's desire to increase its power, to keep a rival from seizing an area, and to acquire markets, trade routes, military or naval bases — all have prompted imperialism. Overpopulation also has caused nations to seize land. Force has often been used, but treaties, investments, and commercial interests sometimes have been used to gain control. Areas brought under the influence of other nations include colonies, spheres of influence, protectorates, trusteeships, and satellites. The United Nations *trusteeship system* is designed to protect weak peoples while they are controlled by nations that are teaching them to handle their own affairs.

INCA, *ing' kuh,* the name of the ruling class of the Inca empire in the Andes. The leaders built a mighty civilization that lasted more than a thousand years, and stretched from Colombia on the north to central Chile on the south.

During this period, the Incas brought many independent Indian tribes under their control. They ruled wisely and had a genius for organization. The people learned how to terrace their fields and to use irrigation for greater production. Surplus crops were stored in government storehouses for times of famine. Excellent highways were built, and government messengers traveled rapidly to every part of the empire.

The Incas made pottery from clay, used gold for beautiful ornaments and decorations, and their weaving is still considered some of the finest in the world. The chiefs lived in stone houses; the farmers in wooden ones.

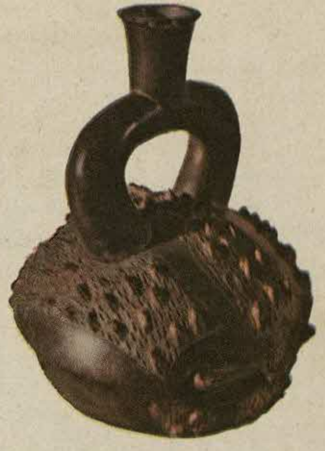
The government was located in Cuzco until shortly before the coming of the Spaniards. The capital was then moved to Quito by Atahualpa, to evade a rebellion by his brother. In 1531 the Inca empire was conquered by Pizarro and his Spanish army. Present day Incas are very poor and largely illiterate. Many still speak Quecha, the ancient Inca language, although there is no system of writing. See ATAHUALPA; PERU; PIZARRO, FRANCISCO.

INCLINED PLANE. A man may put a barrel of oil or gasoline into a truck singlehanded if he rolls it into the truck over an inclined plank. In physics such a plank is an inclined plane, which saves force at the cost of distance. A 400-pound barrel can be lifted into a truck three feet high by a force of 400 pounds. Only 200 pounds of force are needed if the plank is six feet long, and a twelve-foot plank reduces the force to 100 pounds. In practice, the force is seldom applied in a direction exactly parallel to a surface. See MECHANICAL POWERS.

INCOME TAX. Before 1913, the government of the United States, by constitutional limitation, had few good sources of income. It had to depend largely on customs duties on goods shipped into the country, internal taxes on articles manufactured within the country, fees collected from legal documents, and proceeds from the sale of public land. In 1913 the Sixteenth Amendment was ratified, permitting Congress to levy a tax on incomes of individuals and corporations.

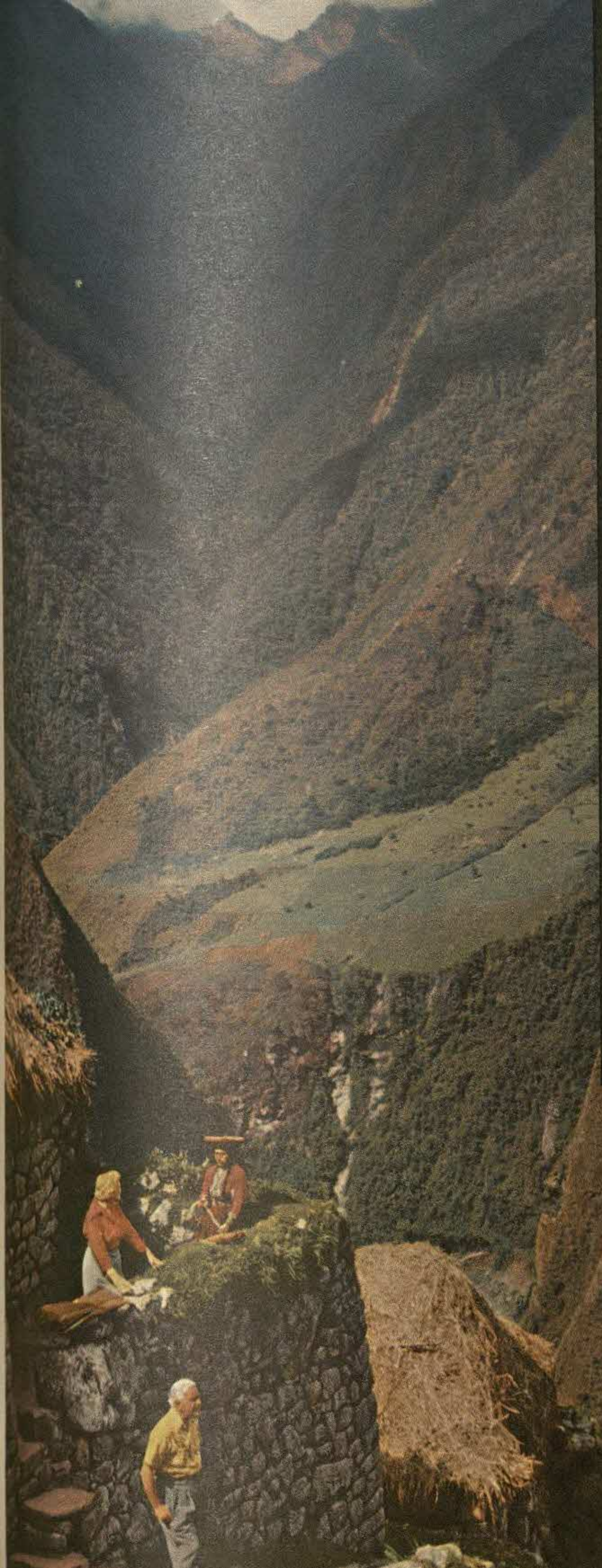
Incomes above a stipulated minimum are taxable. An exemption is allowed for each individual, single or married, and for each dependent child or other relative. Contributions to charity and some medical expenses are deductible. The rates on taxable incomes are graduated, so that individuals and corporations with large incomes pay far more in taxes than do those in lower brackets. The Internal Revenue Bureau of the Treasury Department has charge of the collection of federal income taxes.

History of the Legislation. The Con-



INCA VASE—A.D. 600
The shell pattern and "stirrup spout" style of this vase are typical of much ancient pottery found in Peru.

British Museum from Shell Oil Company



INCA FORTRESS
Machu Picchu, mountain-high citadel in the Andes, was built by the Incas in the 1400's to guard the eastern boundaries of their empire. Its commanding view of the deep valleys made it a perfect lookout—a lookout enjoyed in modern times by peaceful tourists.

Pan American World Airways

stitution states that "no capitation, or other direct, tax shall be laid, unless in proportion to the census or enumeration hereinbefore directed to be taken" (Art. I, Sec. 9, Cl. 4) In keeping with these provisions, the first income tax was passed by Congress in 1862 for purposes of carrying on the Civil War. After nine years it was repealed. When a measure was enacted in 1894 which did not conform to the principles laid down in the Constitution, it was declared unconstitutional by the Supreme Court. The present amendment makes it possible to levy a direct tax without regard to the census.

In the first income-tax act, Congress provided for two levies: a *normal tax* which was levied on all taxable incomes; and a *surtax,* an additional percentage added to the normal tax on higher incomes. Rates have shifted from year to year since that time. After the United States entered World War I, they were so greatly increased that income taxes became the national government's major source of revenue. Lowered in 1924, they remained comparatively low until 1940, when the threat of World War II and the government's need for money to carry out the national defense program led to sharp increases. From then until 1946, each year found income taxes the heaviest on record, and even peace brought little change.

Meantime, in 1943, Congress had passed a "pay-as-you-go" tax, which employers "withheld" from their employees' salaries, then paid over to the Federal Government. It also became necessary for a person having an income not derived from a salary, or in addition to it, to make an advance estimate of his total annual income and to pay his tax on that estimate quarterly. In cases of wrong estimates, adjustments were made at the end of each year.

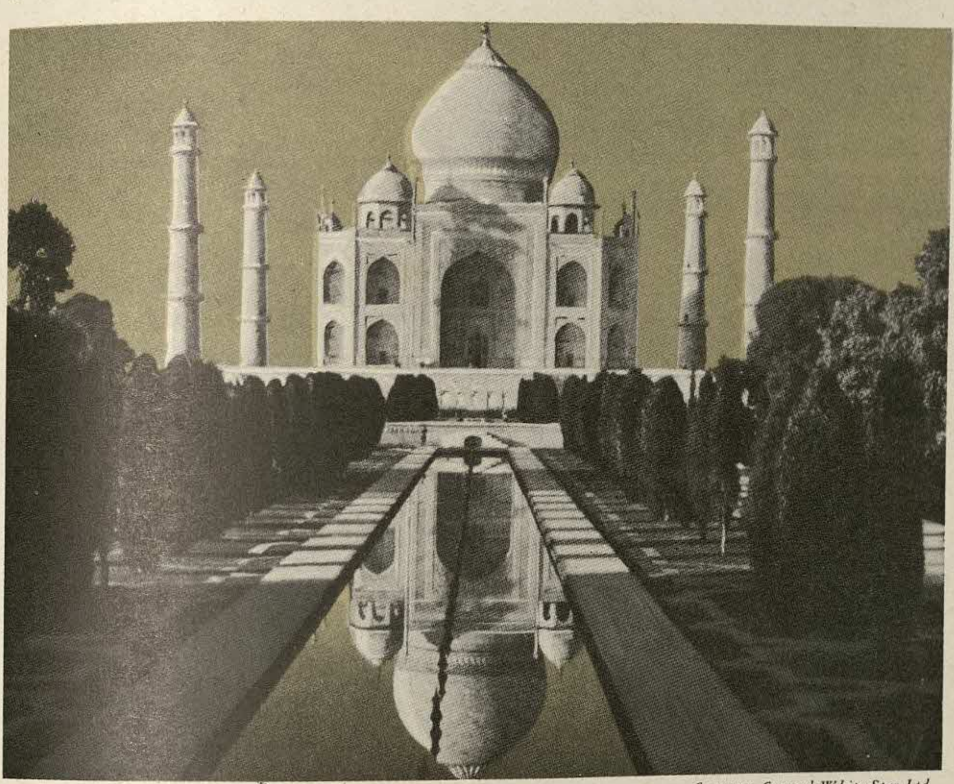
In 1911 Wisconsin became the first state to pass a successful income-tax law. Since then, many other states have enacted such laws, under which income taxes must be paid to the state, in addition to those paid to the Federal Government.

The first income tax in Great Britain was levied from 1798 to 1816 to help finance its Napoleonic wars. A second was adopted in 1842, and that country has had one ever since. Canada began to levy taxes on incomes during World War I. Such taxes are also levied in many other countries. See TAX.

INDEPEND'ENCE DAY. The "glorious Fourth" commemorates the adoption of the Declaration of Independence by the Continental Congress on July 4, 1776. This document, which was drawn up a year after the beginning of the Revolutionary War, during which the thirteen colonies threw off the British rule and made themselves free and independent, gave voice to the doctrines of democracy, justice, and equality of opportunity. At the time of its adoption by the Continental Congress, the Declaration bore only two signatures, that of John Hancock, the president of the Congress, and that of the secretary; later, August 2, 1776, fifty-four other signatures were added, among them that of Thomas Jefferson, who made the first draft of this important document.

In the past, promiscuous and often dangerous shooting of firecrackers was customary in celebration of this day, but the many pleas for "a safe and sane Fourth" have been effective, and it is now observed in a quieter manner, more in keeping with the original meaning of Independence Day. Children should especially be taught the real purpose of the day, which is to inspire them to appreciate the freedom which they now enjoy as citizens of the United States, and to guard the principles of freedom for which their forefathers fought.

INDEPENDENCE HALL. A symbol of American liberty, Independence Hall, on Chestnut Street, Philadelphia, saw the historic meetings of the Continental Congress during the Revolutionary War and the signing of the Declaration of Independence, July 4, 1776. Now an historical museum, the building was originally used for offices and as a meeting hall. In this building may be seen the Liberty Bell.



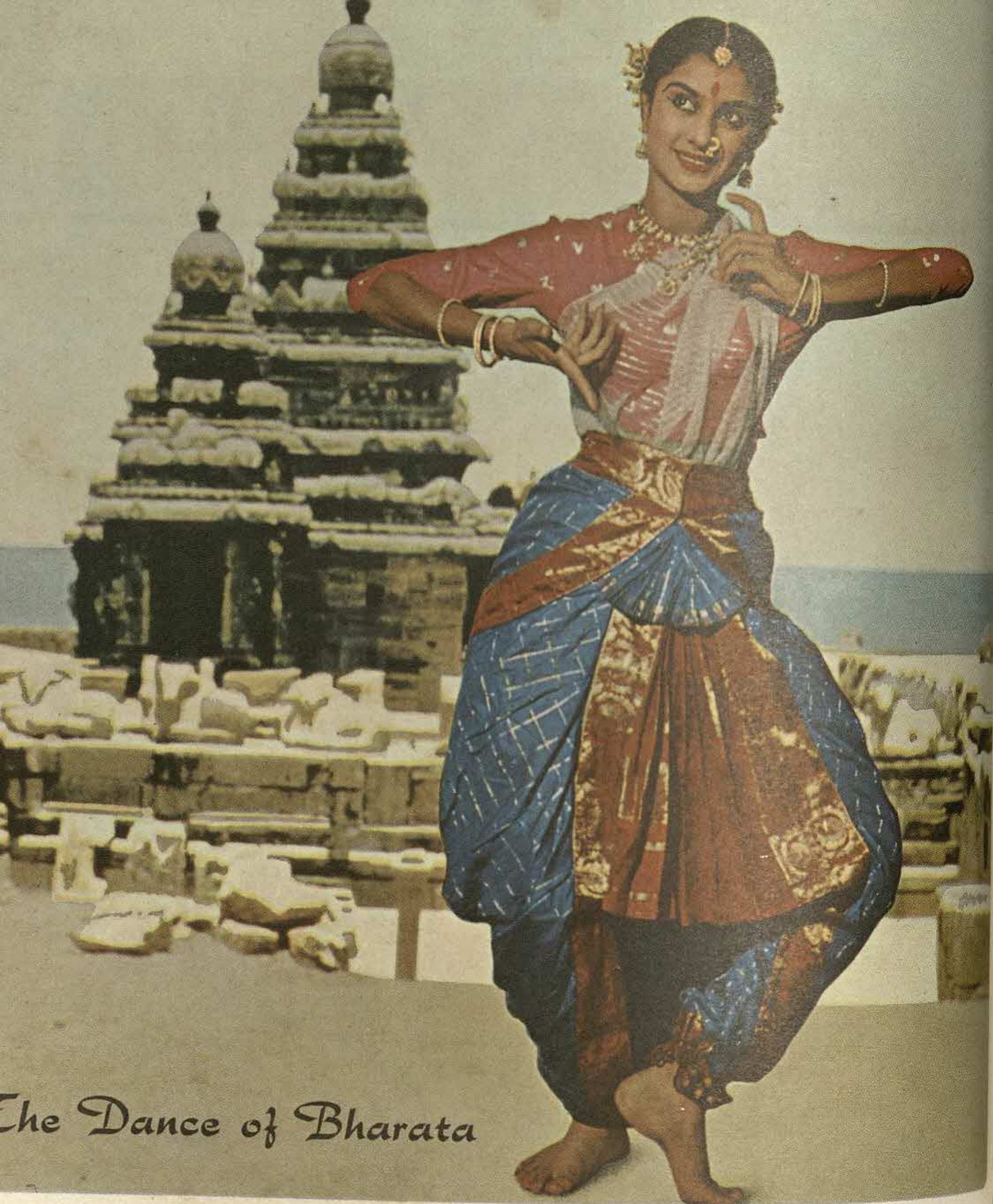
Courtesy Cunard-White Star Ltd.

Pageant *of the* Orient

IN'DIA. Even in ancient times, India's spices, silks, gold, and jewels attracted both invaders and traders to the country. Later, Europe's search for a new route to its riches led to the discovery of America and Australia. Then for nearly a century before 1947, India was "the brightest jewel in Britain's diadem." Free again, it is now divided between two nations. The Hindu-dominated Republic of India is second only to China in population, having about a sixth of all the earth's inhabitants. Although much smaller, Pakistan is the world's largest Moslem country.

A triangular peninsula jutting southward from Asia into the Indian Ocean and covering some 1,581,400 square miles, India is over half the size of the United States and has well over 400,000,000 people. Because it is so huge and so shut off from the rest of Asia by the world's loftiest mountains, it is called a subcontinent. To the east stretches the Bay of Bengal; to the west, the Arabian Sea. Its land neighbors are Iran, Afghanistan, China, Nepal, Bhutan, and Burma.

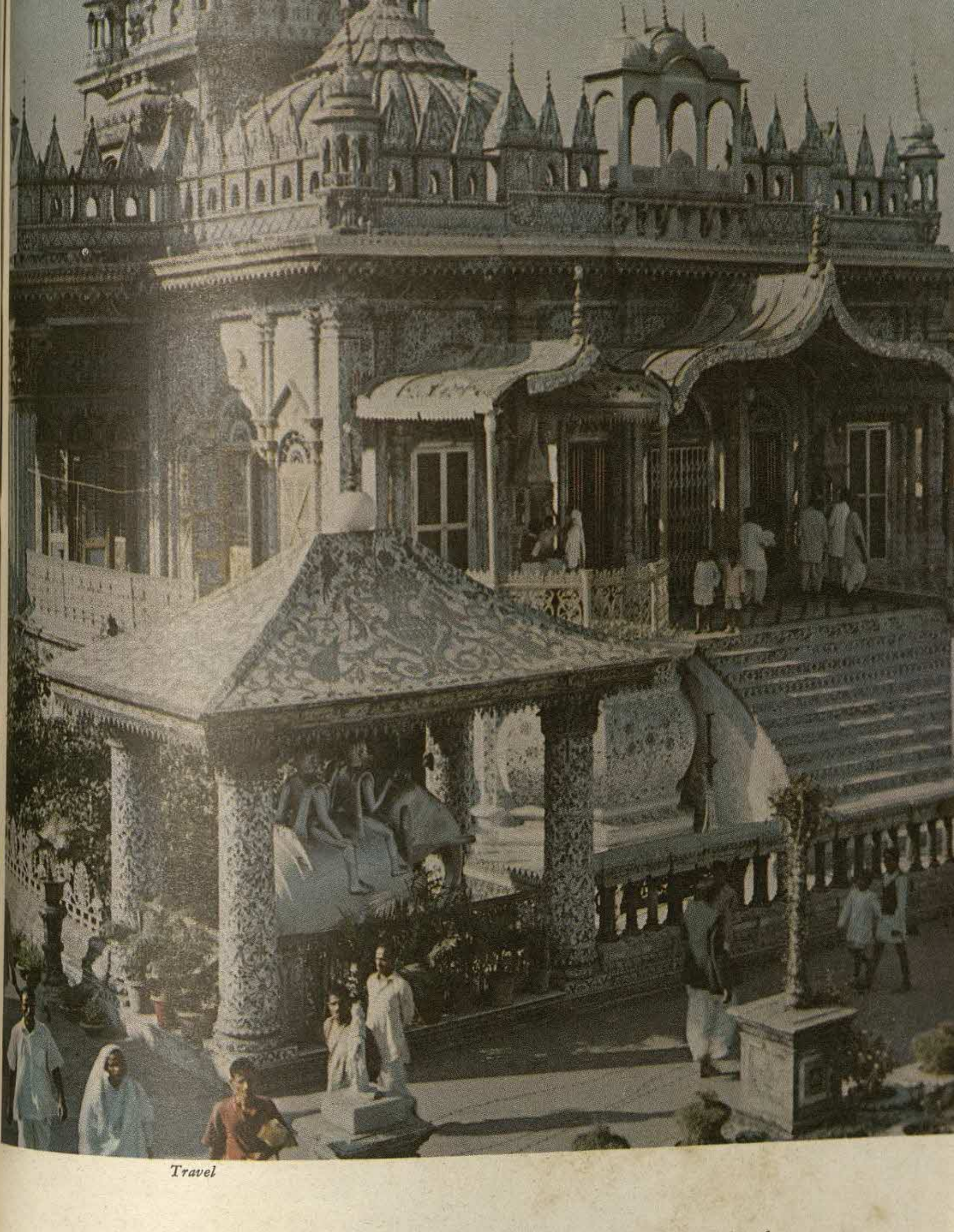
Because India is so different from Europe, Westerners have always considered it mysterious and romantic, but baffling. For one thing, its many Oriental races of differing faiths and tongues, and its myriad contrasts, make it complex. Among its teeming millions are world-famed scholars, writers, scientists, and men of fabulous wealth. But its masses live in squalid mud or stone huts, till their fields with primitive tools, and barely eke out an existence. Over 80 per cent of them can neither read nor write, and thousands die each year from starvation. Yet the Republic of India's Tata Iron and Steel Works is Asia's biggest, only the United States makes



The Dance of Bharata

Courtesy of Government of India Tourist Office

In legends of India the secret of the dance was revealed to the mortal Bharata by the Lord of the Universe. It was then performed by nymphs in the ancient temples. Today it is performed in Indian dance theaters.



Travel

The delicate tracery of the Badri Das temple is an example of the beautiful architecture in India. This is Calcutta's center of the Jain system, an important sect of dissenters from Hinduism.

Bill Witt, Black Star

A HINDU BEAUTY

The vermilion mark on her forehead is a sign that she is married.

more moving pictures, and it has factories, dams, and hydroelectric plants.

India's gifts to the world include two great religions, Buddhism and Brahmanism; Sanskrit, an ancient tongue to which most Western languages are related; and much of our arithmetic. Among its beautiful buildings is the Taj Mahal, often called the world's most beautiful building.

Land and Rivers. Among the mountains of northern India are the Himalaya and Hindu Kush ranges, including the world's loftiest mountains, Everest and Godwin Austen (K2). And the famed Khyber pass leads through the barriers into Afghanistan.

To the south of this rugged area stretches the "Great Indian Plain" formed by India's largest river system — the Ganges to the East and the Indus to the West. Remarkably level, this section is very productive whenever it gets enough rain or is irrigated. On the south the Vindhya Mountains separate the plain from the Deccan, a huge plateau. Though low, this farmland is broken by hills and mountains and is separated from India's coastal plains by the Eastern and Western Ghats.

The Ganges and its greatest tributaries, the Brahmaputra and the Jumna, rise in the Himalaya and empty into the Bay of Bengal. The Indus and its chief branches also are Himalaya-born but flow into the Arabian Sea. Some huge deltas, built up by these rivers, are farmed, but others are giant swamps or dense jungles whose wild beasts are trapped for sale to circuses and zoos. The rivers also supply water for irrigation and hydroelectric plants.

Climate. All India lies north of the equator, but most of it is in the torrid zone and hot the year round. In the northern mountains, however, the weather is bitterly cold, and the lower mountains and hills are so cool that many coastal dwellers summer there. A "monsoon land," India gets most of its rainfall from June to mid-October. The rest of the year is its dry season. The rainfall is heaviest in the northeast in Assam which averages over 430 inches yearly and is one of the wettest spots on earth. In the northwest, though, the Indus valley receives a light rainfall and the Indian Desert is one of the world's driest wastelands.

The People. Most Indians belong to the white race and a large majority also are Hindus. Among these are the Aryans, found chiefly in the Republic of India, and the darker-skinned, Deccan-dwelling Dravidians. Moslems, most of whom live in Pakistan, are the second largest population group. Another main racial group is the tribesmen whose ancestors are believed to have been India's first inhabitants. Still primitive, most of these people are hill-and-jungle dwellers. Hindi and Bengali are most important of the many languages and nearly 200 dialects, but most educated Indians speak English.

Both child marriages and the Hindu caste system, with its many cruel social and economic practices, have been legally abolished in the Republic of India. Under its laws, women are also given the same rights and opportunities as men. Even the old Moslem custom of veiling women's faces from the public is rapidly breaking down. Besides the Hindus and Moslems, other important religious groups are Sikhs, Christians, Jains, Buddhists, and Parsees.

India has many vocational schools, colleges, and universities, but most of its people receive little or no schooling. However, great efforts are being made for mass elementary education.

Most of India's largest cities are located on its coastal plains or in its great northern river valleys, the most densely populated areas. The Republic of India's chief cities include New Delhi, its capital, and its bustling seaports of Bombay, Calcutta, and Madras. Those of Pakistan include Karachi, its capital and western seaport, and Chittagong, its eastern seaport. But a vast majority of the people live in hundreds of thousands of primitive villages dotting the peninsula, and carry on centuries-old customs.

Farming. Some 70 per cent of the people earn their living by tilling the small fields surrounding their villages. Although most sections can raise at least two crops a year and much of India's soil is fertile, famine often stalks the peninsula, causing many hardships and deaths. Indian farmers are hard-working, but their primitive methods and tools keep down their production. Frequent droughts in some sections, floods in others, swarms of locusts, and sometimes even earthquakes also reduce their output. Moreover, India's means of distribution are still so underdeveloped that the people of one section may be dying from starvation while other areas have food surpluses. Since feeding its millions is one of the Republic of India's gravest problems, and grain is one of its chief imports, it is working to modernize its agriculture, to extend its irrigation systems, and to prevent its floods. Famines also occur in largely agricultural and less-populous Pakistan. In some years, however, it can even export grain.

Despite its handicaps, India is the world's top producer of jute, rice, and probably tea. It also raises large quantities of sugar cane, cotton, wheat, tobacco, flax, barley, and rubber. Other important crops include millet, corn, grain sorghums, coffee, indigo, pepper, spices, oilseeds, groundnuts, opium, melons, dates, coconuts, and citrus fruits.

India has about half of all the world's cattle, whose lives are protected by Hindu laws. In many sections these animals serve as beasts of burden, as do water buffaloes, camels, and elephants. Other important livestock includes goats, sheep, horses, donkeys, pigs, and poultry.

Forests. India's extensive forests, on its mountain slopes and in its jungles, have scarcely been touched. Among their many trees are teak, ebony, bamboo, palms, oaks, sandalwood, deodar, satinwood, banyan, acacia, cedars, and pines.

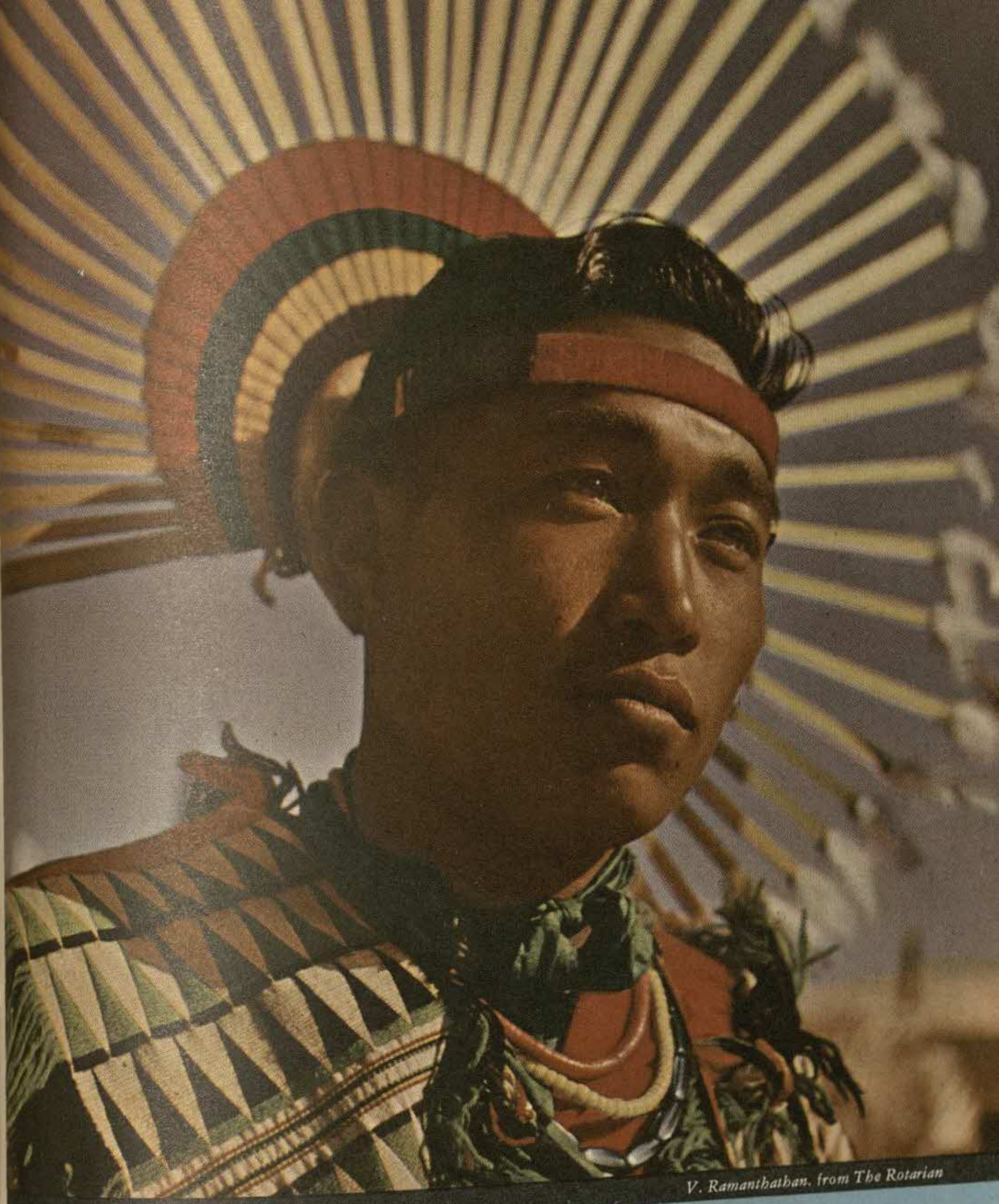
Minerals. Most important of India's extensive and valuable minerals are coal, oil, manganese, ilmenite, magnesite, chromite, salt, saltpeter, and mica. Others are gold, precious stones, kyanite, iron ore, copper, antimony, asbestos, bauxite, silver, tin, tungsten, and graphite. Although some of these are produced in large quantities, the exploitation of India's mineral wealth has only begun.

Manufactures. For centuries, India's artistic handicrafts have been in great demand throughout the civilized world. The Kashmir shawls are famous for their beauty and color (see CASHMERE). Other products made by hand include wood and ivory carvings, silk and metal thread embroideries, and Oriental rugs. The Indians are fine craftsmen in metalwork, using gold, silver, copper, and brass.

Since the introduction of machinery and mass-production methods, begun by the British in the 1850's and greatly speeded up during World Wars I and II, India has become a leading industrial producer and is now striving to be an even greater one. Its chief products are cotton, silk, and woolen textiles, jute and jute goods, iron, steel, paper, sugar, and cement. It also processes various foods, oilseeds, tea, coffee, and tobacco; builds ships; and manufactures chemicals, leather and rubber goods, fertilizers, automobiles, airplanes, bicycles, aluminum, soap, matches, and plastics.

Transportation and Trade. Air service links India's cities with one another and the outside world. The peninsula also has thousands of miles of railroads and of improved highways, traveled by buses and automobiles. Yet many of its roads are suitable only for camel caravans or pack ponies, and in many other sections the wooden cart, drawn by camel or bullock, is the peasants' chief means of transportation. India extensively uses its rivers as highways and does a great deal of coastwise shipping. Since the days of the early caravan routes, it has also been one of Asia's chief commercial countries. Among India's exports are raw and processed jute, tea, cotton and cotton goods, rice, coffee, lumber, raw wool, and hides. Pakistan imports coal for its industries, and the Republic of India, large amounts of food.

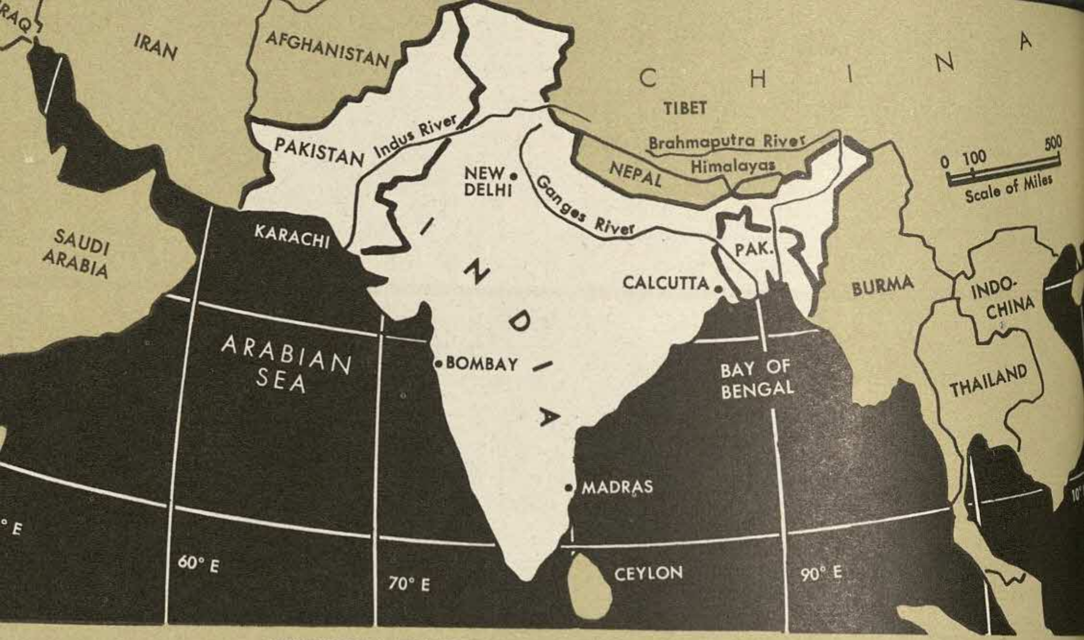
History. Excavations prove that one of the world's earliest civilizations had developed in the Indus Valley before 3000 B.C. It is also known that the Aryans,



V. Ramanthathan, from The Rotarian

DRESSED FOR A CEREMONIAL DANCE—NAPA STYLE

Music and dancing are popular with the tribes who live in the northern part of the Napa Hills between Assam and Burma. Their strange customs include killing fish with intoxicants and raising dogs for food. Some tribes make huge wooden xylophones which are used for alarms or to celebrate important happenings. Nearly every village has its own dialect, so communication is difficult.



HISTORIC DIVISION OF A HUGE SUBCONTINENT

One of the great events of the twentieth century was the emergence of the Indian subcontinent from British control and the creation of independent India and Pakistan.

or Hindus, swept down from Central Asia about 2500 B. C. and conquered India's natives, then carried their civilization into all parts of the peninsula. In the 500's B. C., Buddhism was founded there, and in 326 Alexander the Great made a short-lived invasion of the northwest. Between 273 and 232 B. C., Asoka, a native ruler, united India into a mighty empire, but after his death, it broke up into rival states again.

Although Mohammedan traders and invaders began to influence India in the 700's A. D., it was not until Mahmud of Ghazni's invasion of 1001 that the Moslems started to gain control of the peninsula and to exert a deep influence upon it. In 1526 a great Mongol invasion, under Babar, led to the founding of a Mogul empire, which did not begin to decline until nearly two centuries later.

Taking advantage of India's weakness, the Europeans who had already established trading posts on its coasts then began to struggle for control of the country. After the bitter conflict between England's East India Company and the French was ended by Robert Clive's victory in the Battle of Plassey in 1757, the company became the strongest power in the peninsula. Under Clive and his successor, Warren Hastings, numerous native uprisings were put down and the company's rule was extended and strengthened. Then came the Sepoy Rebellion of 1857, which began when Indian soldiers massacred Englishmen and ended in a British victory and cruel reprisals. Feeling that the company had frequently represented imperialism at its worst, the British Government took over control in 1858.

Although Britain did much for India, the Indians began to demand more of a voice in their government. After World War I, in which India furnished soldiers and supplies, Indian unrest increased, and Mohandas Gandhi, the nationalists' leader, urged his countrymen to conduct nonviolent revolts against the British. Although Britain tried repeatedly to put down the nationalist movement, it was forced to grant some of India's demands.

India reluctantly helped Britain in World War II and finally gained its freedom as its reward. Because its two largest religious groups could not agree upon a single government, the peninsula was divided between them in 1947. Since then, numerous conflicts have arisen between the two nations, and each has faced many other very difficult problems in trying to modernize itself. Although both are British Commonwealth nations, only Pakistan pays allegiance to the British Crown, for the Union of India gave up its dominion status in 1950 and became a republic. Both countries belong to the United Nations.

Also see the following articles:

Alexander the Great
Arithmetic
Aryan
Asia
Black Hole of Calcutta
Bombay
Brahmanism
British Commonwealth
Buddhism
Calcutta
Caste
Clive, Robert
Delhi
East India Company
Fakir
Gandhi, Mohandas K.
Ganges
Hastings, Warren
Himalaya Mountains
Hindu and Hinduism
Hindustan
India, Republic of
Indian Architecture
Indian Ocean
Indus
Khyber Pass
Kipling, Rudyard
Mohammedanism
Nicobar Islands
Pakistan
Parsees
Ramayana
Rupee
Sanskrit Language
Sepoy Rebellion
Shah Jehan
Sikhs
Siva
Taj Mahal
Trade Routes
Timur
Vedas
Vishnu
World War (I, II)

INDIA, Republic of. One of the world's largest and most populous nations, the Republic of India covers about 1,260,000 square miles, and has about 397,540,000 people. Having received, at its birth in 1947, India's largest cities and most of its known mineral wealth and industrial facilities, it is also very rich. Although it is one of the world's industrial leaders, feeding its masses and improving their lot are grave problems it is striving to solve. It is a predominantly Hindu nation, and Hindi is its official language. Bombay and Calcutta are its largest cities and seaports; New Delhi, its capital.

Government. First called the Union of India, it became a "sovereign democratic republic" in 1950. Although it then gave up its dominion status, it remains in the British Commonwealth, but pays no allegiance to the Crown. Its two-house Parliament makes its laws. Its real executive head is the Cabinet, headed by the Prime Minister and responsible to the lower chamber; its elected President is a mere figurehead. Its constitution guarantees religious freedom and other civil rights to all, permits citizens over twenty-one years old to vote, and bans the caste system. Nearly all of India's former princely states are now included in the republic, which owns Andaman and Nicobar islands and has the Himalayan state of Sikkim under its protection. See India and related articles.

By Ewing Galloway, N. Y.; Acme Photo

ANCIENT TRADITION — MODERN PROGRESS

Sacred cattle still roam the streets of India's cities, yet India's leaders, including such women as Madame Pandit, have taken an increasingly prominent part in world affairs.

AT THE CROSSROADS OF AMERICA
The capitol building at Indianapolis symbolizes the sovereignty of one of the first states to be carved from the Northwest Territory. Indiana entered the Union in 1816.

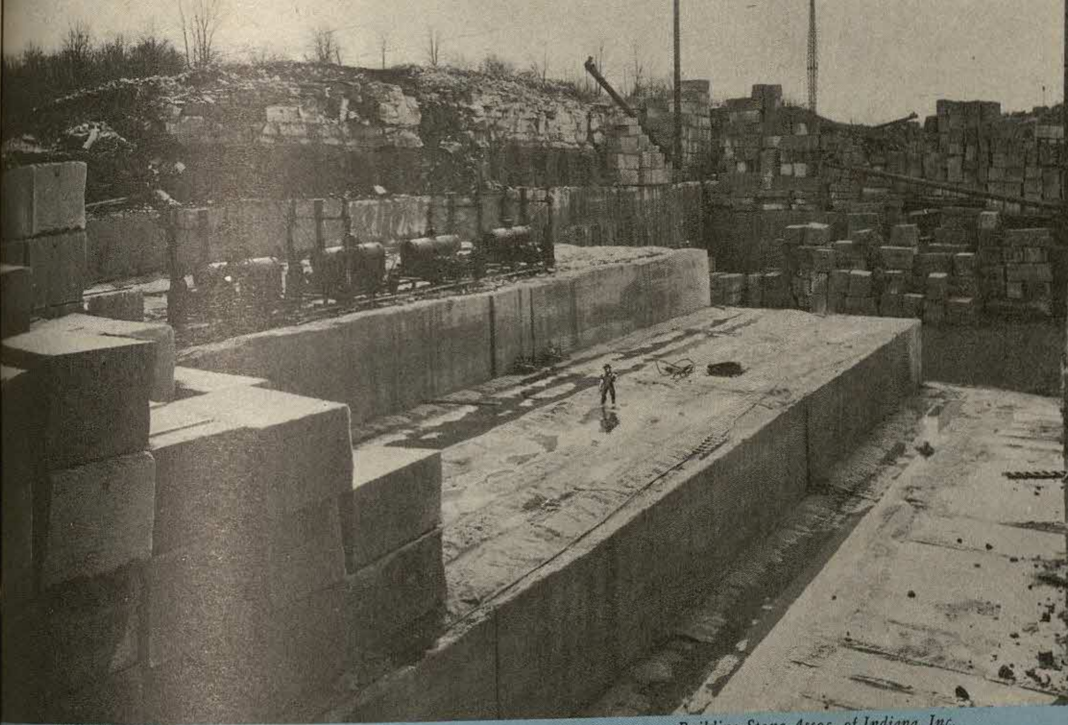
INDIAN'A. With abundant natural resources, fertile farm lands, and thriving industries, Indiana, extending from the southern tip of Lake Michigan to the Ohio River, is one of the most prosperous of the Middle-Western states of the Union. It is also noted for its scenic resorts, state parks, and mineral springs.

The "Hoosier State" is even prouder of its illustrious sons and daughters. President Benjamin Harrison and Vice-Presidents Schuyler Colfax, Thomas Hendricks, Charles Fairbanks, and Thomas Marshall were Indianans. So, too, were statesman-author Albert Beveridge, Republican Presidential candidate Wendell Willkie, and labor leader Eugene V. Debs. The state's noted authors include Booth Tarkington, James Whitcomb Riley, Edward Eggleston, Lew Wallace, Meredith Nicholson, Theodore Dreiser, Charles Major, George Barr McCutcheon, George Ade, Gene Stratton Porter, George Jean Nathan, Robert S. and Helen M. Lynd, and Claude Bowers. Cartoonists "Kin" Hubbard and John T. McCutcheon and newsman Ernie Pyle were Hoosiers. Other famous Indianans include songwriters Paul Dresser, "Hoagy" Carmichael, and Cole Porter.

Hoosier Land and Water. Like all the other states lying in the Central Plains region, Indiana is largely a rolling prairie. The surface, for the most part, slopes to the southwest, and many of the rivers flow in this direction. There are three major ports on Lake Michigan, connected with world seaports by the Saint Lawrence Waterway. At the western end of the lake coast is a region of sand dunes, part of which forms a state park. Northeastern Indiana contains many small lakes and swamps, and much excellent farm land.

Extending from this region to the Wabash River in the south-central section is a wide expanse of level land, easy to cultivate with modern farm machinery. It was at one time heavily timbered, but the forests have been cleared and the fertile soil makes it one of the best agricultural regions to be found anywhere. The southern part of the state is hilly and covered with rocks. Here are many sandstone and limestone formations which have been carved into fantastic shapes by rain and underground rivers. The beautiful caverns found in this region, particularly Wyandotte Cave, compare favorably with Mammoth Cave.

The Wabash is the largest river in In-



Building Stone Assoc. of Indiana, Inc.

THE HOME OF MIGHTY "BUILDING BLOCKS"

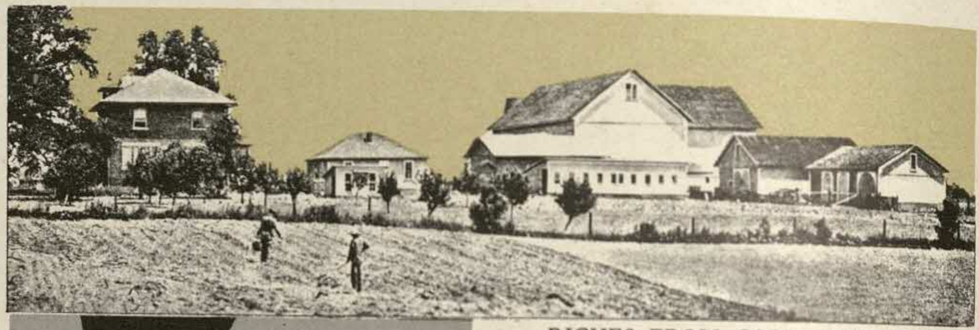
From quarries like this one in southern Indiana come vast supplies of fine limestone for use in construction. Other varieties are used in the blast furnaces of the steel industry.

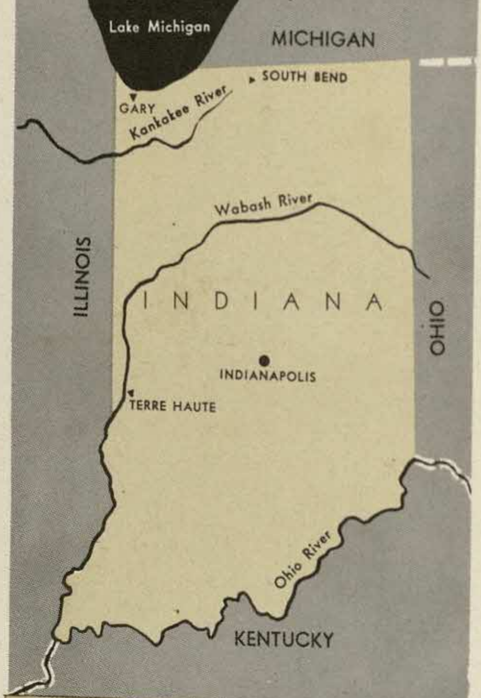
diana, flowing entirely across the state, forming a part of the western boundary, and finally emptying into the Ohio River. The White River, with its two branches, is second in size and is the most important tributary of the Wabash. Other large rivers are the Maumee, the Saint Joseph, Saint Marys, the Whitewater, and the sluggish Kankakee. There are many other smaller streams, but they are of little importance.

Climate and Soil. Indiana has a fairly uniform climate with an average temperature of 52°F. However, because of its great length there is a difference of almost ten degrees between the temperatures of the north and south sections. Winter in the north is frequently long and cold, while in the south it is not nearly so severe. The summer climate is warm and humid. The amount of rainfall varies from north to south, and the southern parts sometimes have ten inches more than the north.

Products of the Land. Indiana is a Corn Belt state and agriculture is by far the most important industry. Of the 23,000,000 acres in the state about 20,000,000 are devoted to farming. Corn is their most important crop, but large amounts of soybeans, wheat, hay, oats, rye, and barley also are raised. The United States' top producer of peppermint and spearmint is northern Indiana, which also produces large yields of potatoes, onions, and other vegetables. Indiana is one of the nation's greatest tomato suppliers, raises tobacco in the south, and grows fine berries, melons, apples, cherries, and peaches. Hogs, dairy and beef cattle, eggs, poultry, sheep, horses, mules, and honey are other important products.

Mineral Resources. Indiana is noted for its rich coal deposits, which underlie an area of about 7,000 square miles in the western and southwestern parts of the state. Mines in this region produce more than 20,000,000, tons of high-quality bituminous coal each year. Large areas of natural gas were discovered in Indiana in 1886, and for a long time served a growing manufacturing industry. However, the supply has slowly diminished, and now it is used only

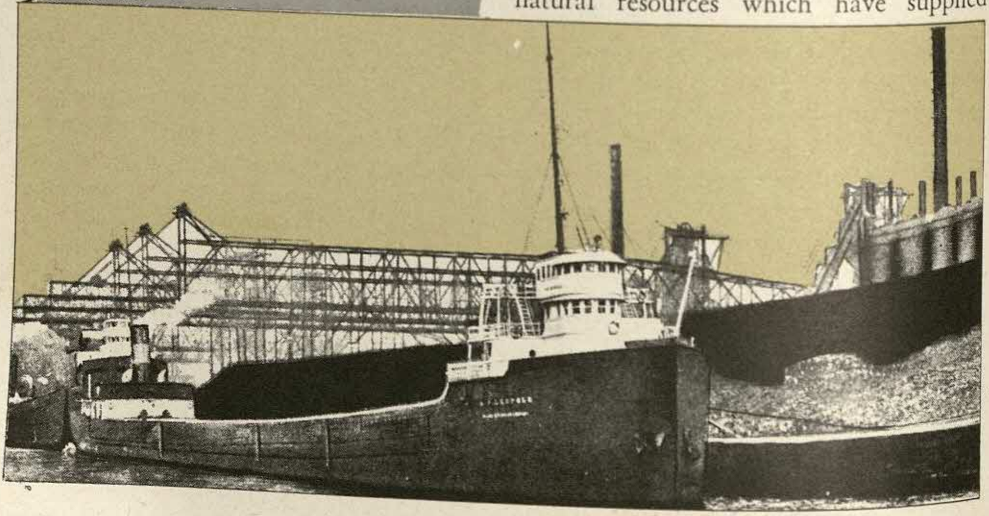




RICHES FROM CORN AND COAL
Agriculture and Industry join forces to increase Hoosier prosperity. Indiana farms blanket nine tenths of the state's surface. In Lake Michigan ports, Indiana coal and limestone turn iron ore from the north into steel.

in homes. Southern Indiana's Bedford limestone is a nationally famous and much-in-demand building stone. The state also supplies large amounts of limestone for use in making steel, roads, cement, and lime. Oil, extensively found in its gas fields and in the southwest, encourages industry, and fire clays, sand, and gravel are especially important products.

Industry and Transportation. Several factors have combined to make Indiana one of the leading manufacturing states. Of first importance is its nearness to great markets, where manufactured goods as well as farm products can be readily sold. Along with this advantage are the state's excellent transportation facilities, and the natural resources which have supplied



Courtesy Indiana Historical Bureau

WIND-BLOWN BEAUTY OF HOOSIER SHORES
In the dunes region of Northern Indiana, the persistent westerly winds sweep off Lake Michigan to create landscapes of fantastic charm in lofty hills of rolling sand.

the raw materials its industries need.

The state's greatest industry is the manufacture of iron and steel and their products, centered in the Calumet area along Lake Michigan. Receiving their iron ore by boat from Minnesota and their coal and limestone from Indiana and Illinois, the steel plants of this area, including those at Gary and East Chicago, are among the world's largest. Other industrial establishments found here include cement and soap factories and some of the world's hugest oil refineries. Besides packing meats and canning vegetables, Indiana makes agricultural and other machinery, automobiles, electrical appliances, drugs, medicines, glass, and many other products.

Indiana has excellent railway and air service, as well as a fine system of improved highways, including part of the historic National, or Cumberland, Road, now called U. S. 40. It also ships freight by boat over Lake Michigan and the Ohio.

The People. A large majority of Indiana's nearly 4,700,000 people are native-born, and over half are urban dwellers. Indianapolis, the capital, Gary, Fort Wayne, Evansville, and South Bend are major cities.

In 1825 the great Welsh reformer Robert Owen started a co-operative community at New Harmony. Although it failed, it contributed a great deal to American education. So, too, did the "platoon system," which William Wirt introduced at Gary in 1907. Today the state maintains an excellent school system, including Indiana and Purdue universities and several teachers' colleges. Its outstanding private educational institutions include Notre Dame, De Pauw, Butler, and Valparaiso universities; John Herron Art and Rose Polytechnic institutes; Earlham, Hanover, Wabash, and Evansville colleges; and Culver Military Academy.

Under its 1851 constitution, Indiana's chief executive is a governor, elected for four years and not allowed to succeed himself. Its legislature is composed of 50 senators and 100 representatives. A supreme court heads its judiciary.

History. Sieur Robert Cavelier de La Salle, the French explorer, was probably the first white man to invade this stronghold of many small Indian tribes. In 1680 he traveled through the valleys of the Wabash and Ohio rivers, looking for sites for forts and trading posts. During the next twenty years, several temporary forts and settlements were built. The French established the first permanent settlement at Vincennes in 1731. Others were made later at Fort Wayne and Terre Haute.

The French were defeated by the English in 1763 and were forced to cede the territory to Great Britain. George Rogers Clark conquered it during the Revolutionary War, after which it was ceded to the United States. It became a territory in 1800. Several Indian tribes held a large part of the region at this time, and many massacres took place and several battles between soldiers and the Indians.

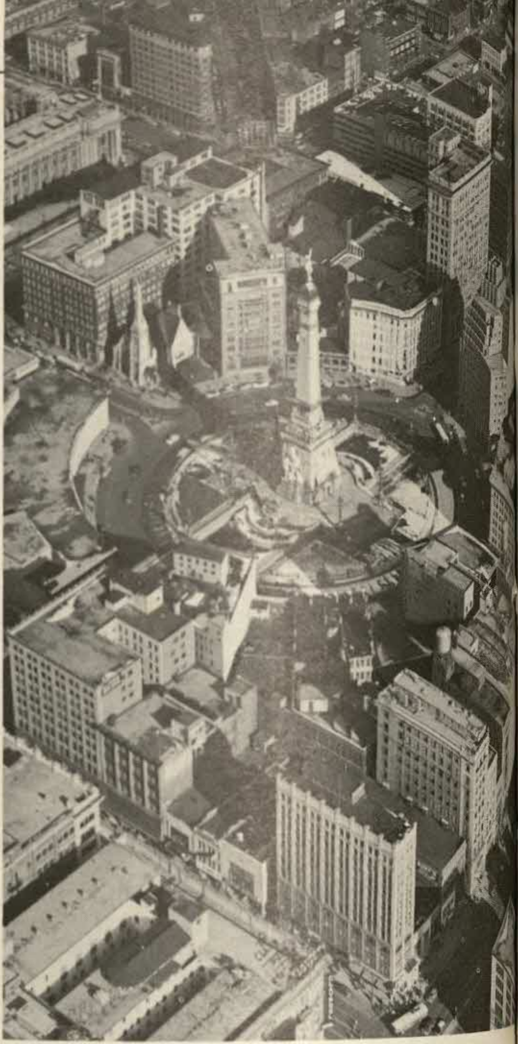
Indiana was admitted to the Union in December, 1816, as the second state to be carved out of the Northwest Territory. The first capital was Corydon, but Indianapolis was chosen in 1825, because of its central location. See CLARK, GEORGE ROGERS; INDIANAPOLIS; NORTHWEST TERRITORY.

INDIANAPOLIS, IND. Capital of Indiana and the largest metropolis in the state, Indianapolis is also the biggest United States city not on navigable water. It is centrally located near the middle of the state and the nation and is served by many railroads, highways, and air, bus, and truck lines. It is a great livestock and grain market and manufacturing center.

The true center of the city is the "Circle." From this point, principal streets radiate in every direction. The two principal streets are Meridian, running north and south through the "Circle," and Washington, which pierces the heart of the city in an east-west direction. A city of fine homes, Indianapolis was laid out by Alexander Ralston, following the plans of Major L'Enfant, the designer of Washington, D.C.

Among the city's outstanding structures are the Indiana War Memorial (National Headquarters of the American Legion), the Scottish Rite Cathedral, the state capitol, and the public library. Here also are located the Indiana Medical Center covering 125 acres, beautiful parks, drives, and golf courses. Butler College, the Indiana Central College, several divisions of Indiana University, and the John Herron Art Institute are notable.

Indianapolis is the home of the famous Motor Speedway located on the northwest edge of the city. America's greatest auto-



Indianapolis Chamber of Commerce

DOWNTOWN INDIANAPOLIS

Indianapolis, like Washington, D.C., is planned so that all streets radiate from a central point. The Indianapolis War Memorial occupies Monument Circle, the focal point of the city.

mobile race is held on this two-and-one-half mile oval every Memorial Day. Crowds of more than 150,000 flock to see this exciting event.

Indianapolis was settled in 1819, named two years later, and in 1825 became the capital of Indiana. The town government was instituted in 1832, and in 1847 Indianapolis was chartered a city, with a mayor and council. A new plan of city government went into effect in 1891. The population is about 475,000.

INDIAN ARCHITECTURE. See INDIA; TAJ MAHAL.

INDIAN OCEAN. Lying for the most part below the equator and extending southward from Asia, the Indian Ocean is the third largest body of water in the world, exceeded only by the Atlantic and Pacific oceans. The warm, moist monsoon wind constantly blows across it, bringing rain to the lands on its shores. On the north it washes the shores of three great Asiatic peninsulas—Indo-China, India, and Arabia —and it extends southward to the Antarctic Ocean. On the west is Africa, and on the east the Malay Peninsula, Sumatra, Java, and Australia. The area is about 28,000,000 square miles, and the average depth is about 11,000 feet. The greatest depth is more than four miles.

Particularly in its northern parts, ships from all over the world ply the Indian Ocean, trading with the leading ports along its shores. Part of its commerce comes from its great branches, streams which include the Zambezi of South Africa; the Indus, which flows into the Arabian Sea; and the Ganges, which drains into it through the Bay of Bengal. It also receives the Tigris and Euphrates rivers through one of its long arms, the Persian Gulf. Another arm of the Indian Ocean is the shallow Red Sea. Many important islands lie in the Indian Ocean, including Ceylon and Madagascar. See OCEAN.

INDIANS, AMERICAN, of today live on reservations, in cities and towns, and on farms. They are the descendants of the first Americans who inhabited the forests and valleys and plains of North and South America long before Columbus saw them and wrongly named them Indians. It is believed that the Indians originally were an Asiatic people who crossed to America over a land bridge that once connected Alaska and Siberia. This is probable because of their resemblance to tribes who live in northeastern Siberia.

If the Indians came from Asia, they probably came in small groups, wandering slowly south and east. Some crossed into California, continuing southward through Mexico, Central America, and into South America. By the time the first white men came to the New World, they were spread throughout the continents and islands, with a population of about 846,000 in North America.

It must be remembered that not all the Indians were alike. Some lived in a primitive style, such as the Indians of the plains and woodlands. Others reached a high state of civilization—the Mayans in Central America and the Incas of South America. Their languages differed as greatly as the various tongues of white men; so did their customs, their culture, and their habits. Not all Indians were brave or cruel, any more than all white men are brave or cruel. Some tribes lived mainly by hunting —others, living in warmer regions, learned to grow crops. Each tribe had a different religion, but all worshiped spirits or gods of the sun, moon, animals, and forces of nature.

Contributions to Civilization. Climate, land, and their customs were all responsible for the many contributions made by the Indians to civilization. Many were farmers and introduced the white man to the important grain we now call corn. Pumpkins, potatoes, tapioca, tomatoes, peanuts, pineapples, and many other foods were first cultivated by the Indians. They were the first to raise turkeys and use rubber, chicle, vanilla, tobacco, cocaine, and quinine.

Their art in pottery making, basketry, and weaving still remains a wonder to modern man, who, in spite of machines,

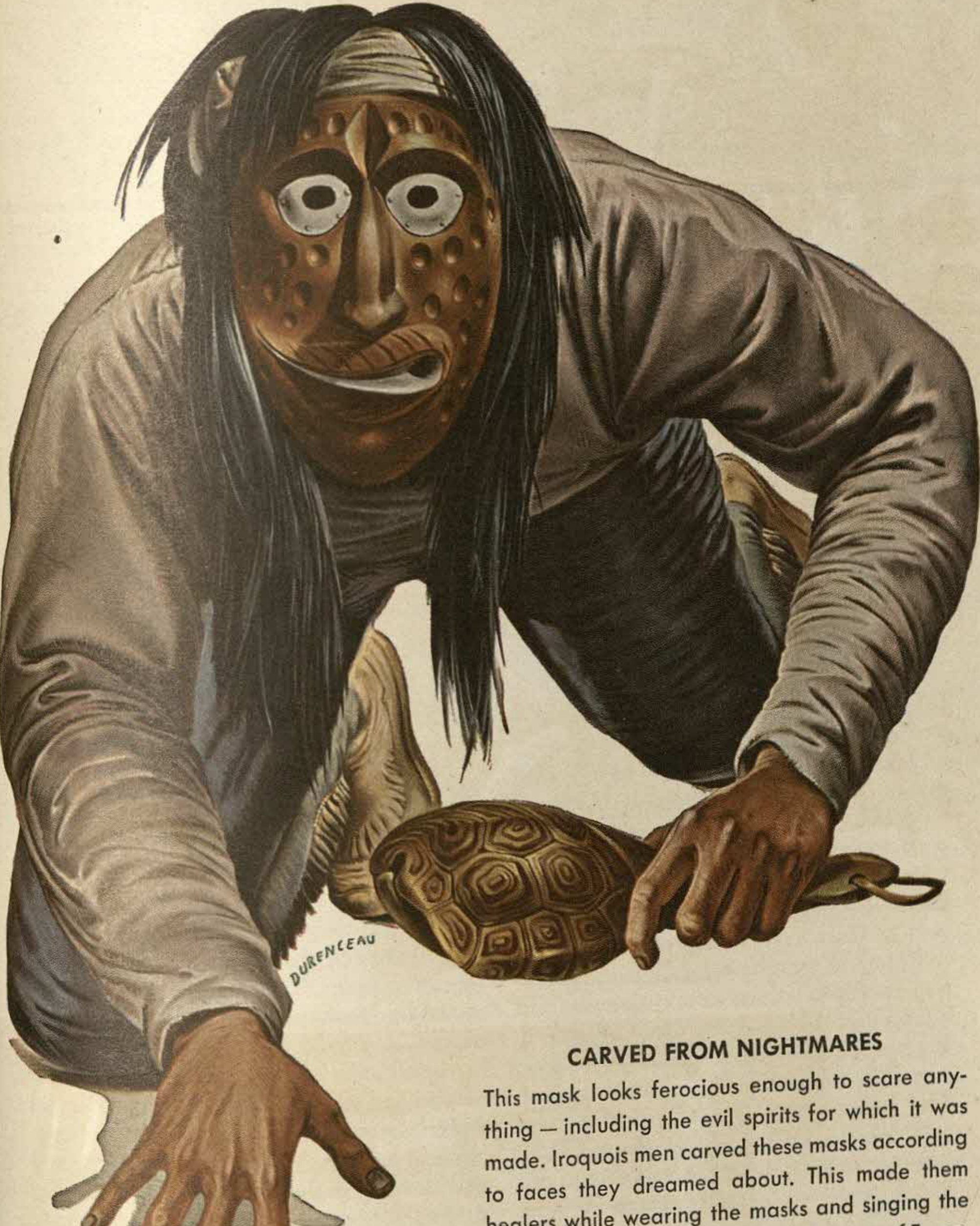
CARRYING ON A TRADITION

Although most Indians today wear modern dress, their tribal customs are passed from generation to generation. The Kiowa boy, left, wears the traditional dress and at an early age learns the Kiowa dance for ceremonials.

INDIANS AT HOME

Below, Indian girls receive early training to learn the weaving skills of their mothers. Many tribes gather their own wool, dye it in various colors, and then make fabrics and blankets on home-constructed looms. The intricate designs are also original, some with special significance.

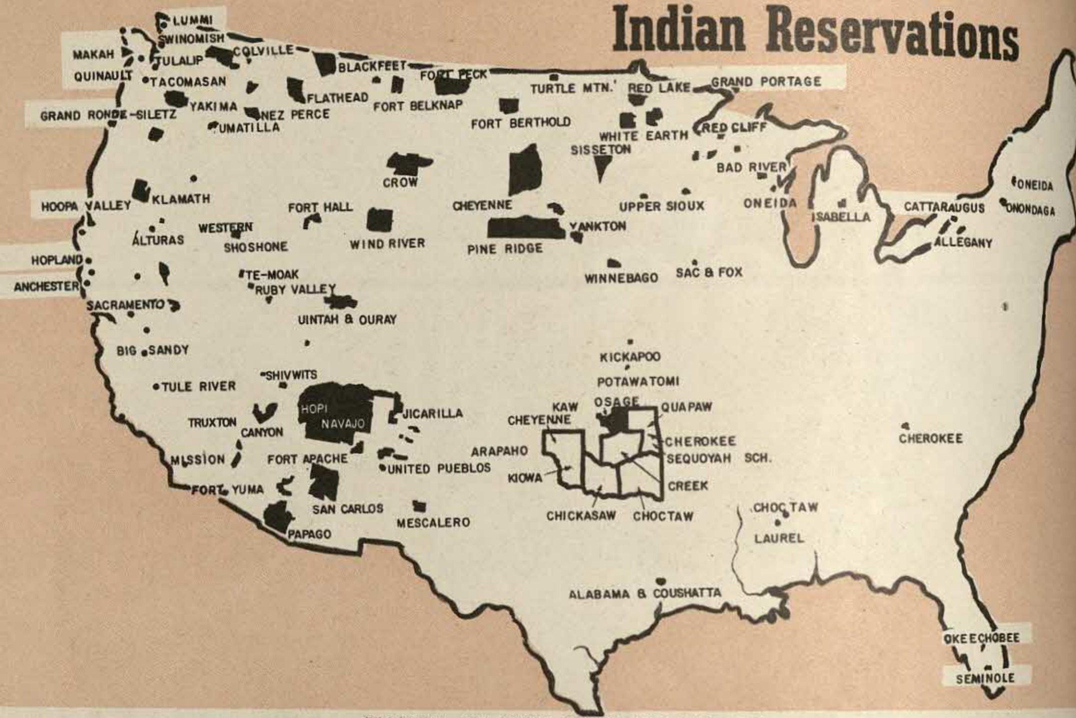
Photo by Josef Muench from Natural History Magazine



Travelers Insurance Company

CARVED FROM NIGHTMARES

This mask looks ferocious enough to scare anything — including the evil spirits for which it was made. Iroquois men carved these masks according to faces they dreamed about. This made them healers while wearing the masks and singing the proper songs. A group, called the Society of Faces, danced through the village in the spring and fall when sickness was common. Wearing their hideous masks and waving turtle-shell rattles, they sang in a curious nasal twang. This was supposed to drive away the evil disease spirits. The society is still in existence, but modern Iroquois chase the spirits out of the village by automobile.



HOMES OF THE INDIANS TODAY

Most of the Indian reservations and tribal lands are located in the western United States. Indians control 52,000,000 acres of the country. The largest tract of land is the Hopi-Navaho reservation in Arizona and New Mexico.

has been able to improve on them little. The Indians taught the white man how to fish for salmon, how to build light, strong boats called canoes, how to travel over snow with snowshoes, and carry his goods on toboggans. The Indian pueblo houses and adobe dwellings influenced the architecture of their region. Another important contribution was the principle of conservation—tc use only enough raw materials and kill only enough animals to suit the need. We know today, after a bitter experience, how right the Indians were in this respect. The Indians also enriched the language with such words as *succotash, moccasin, hominy,* and the names of so many of our states, cities, rivers, and counties. Illinois, Ohio, Michigan, Chicago, Mississippi, Canada, and Minnesota are only a very few of these.

Where the Indians Lived. The most advanced of the Indians lived in Mexico, Central America, and South America. Here, the climate was mild; animals and plants abounded. As more Indians moved to these lands, in order to feed them all, they had to learn how to grow plants. They found out how to irrigate the soil, and those in South America tamed the llamas and alpacas so that their toil would be easier.

Because farming was easier than hunting, the people turned their talents to make pottery and dishes. They invented a loom that resembled the looms of the Mediterranean people. The Incas of Peru were especially proficient in weaving. These people also used silver, tin, and copper for ornaments and implements, and built palaces and temples. The Mayas of Central America invented a form of picture writing and kept records of their life and times and developed the idea of zero in mathematics. There was a good deal of trade among these people, and roads were built so that goods could be carried easily. But these Indians, the Incas, Mayas, and Aztecs, were conquered by the Spaniards, and their civilizations submerged.

In North America, the Indians were not quite so advanced in their culture, although they lived well, according to their needs and their surroundings. In the southeast of what is now the United States, the peo-

New Mexico State Tourist Bureau

INDIAN ART FROM CLAY

Collectors prize pottery made by the famous Maria Martinez of the Pueblo of San Ildefonso in New Mexico. Development of pottery enabled early Indians to store food.

ple lived in villages of rectangular houses with curved roofs. Surrounding the villages were walls of logs to keep out enemies. Their implements were made of bone, stone, and wood, and they traveled on the rivers in hollowed-out logs. Their ornaments were fashioned from stone, shells, feathers, and sometimes copper which they obtained from the north. They cultivated the land and kept gardens, dressed in the skins and hides of animals, and worshiped their gods by building mounds and holding ceremonies. Sports like wrestling, running, and jumping were part of their life.

The most important of these Indians were the Cherokee, Powhatan, and Seminole. Most of them live today in Oklahoma, but many, like the Seminoles in Florida, still live in the Southeastern states.

The Indians most people think of are the woodland red men, for they were the inhabitants of the forests which the white man penetrated when he commenced his march westward. Familiar with the secrets of nature, these Indians taught the white settlers many useful things. The Pilgrims, for instance, learned from these Indians how to grow corn, squashes, and pumpkins, and how to fertilize the soil. But they were fierce and savage warriors at times.

Most prominent of the woodland tribes were those composing the Iroquoian and Algonquian groups. They had a democratic government, often lived in strong houses constructed of logs and poles covered with slabs of bark, trapped furs, and traded with the settlers. Farther north, the woodland Indians figured in the expansion of the Hudson's Bay Company; and, even today, tribes live in wigwams, hunt caribou, and use dog sleds, as they did many years ago. These Indians of the Northern United States and Canada taught the white man the use of the canoe, moccasins, snowshoes, and toboggans; were the guides for the early French explorers; and were the leading traders with the white men. Their names exist in the titles of states, cities, rivers, and towns throughout this section of the continent.

The plains Indians, with whom the pioneers of the West had so much trouble, originally were friendly with the white men. Before the coming of Coronado and other Spaniards, they had no horses, using dogs for their beasts of burden. But the horses the Spaniards gave them proved to be a great help. They raised them, became expert horsemen, and used them as beasts of burden, enabling them to follow the buffalo herds which supplied their main source of food. They lived in tepees and, in some cases, in earth houses. Each tribe had a different language, requiring the use of sign language between the tribes.

The plains Indians became enemies of the white men when the settlers began to occupy the land where the buffalo roamed. The white men were wasteful, killing far more buffalo than were needed; and when the Indians saw their supply of food diminishing, they made war on the intruders. They were the last of the Indians to resist the encroachments of the white men, not giving in until the 1880's.

Today, they live on reservations throughout the West, and their interests are protected by the government. Many of them have become farmers, although they had a difficult time adjusting themselves to such a life after years of wandering and hunting. Their beadwork and painting are exceptionally artistic, and they are being encouraged to continue this form of work.

In the Southwest, the Indians led an entirely different form of life. Here, the Pueblos built houses on top of mesas and cliffs which they could approach only by climbing precarious walls of stone. Their houses were built of adobe mud and were placed on top of one another like apartments. Sheepherding is the chief occupation of the peaceful Pueblos of today, who also turn out some of the finest silversmithing, blankets, pottery, and basketwork.

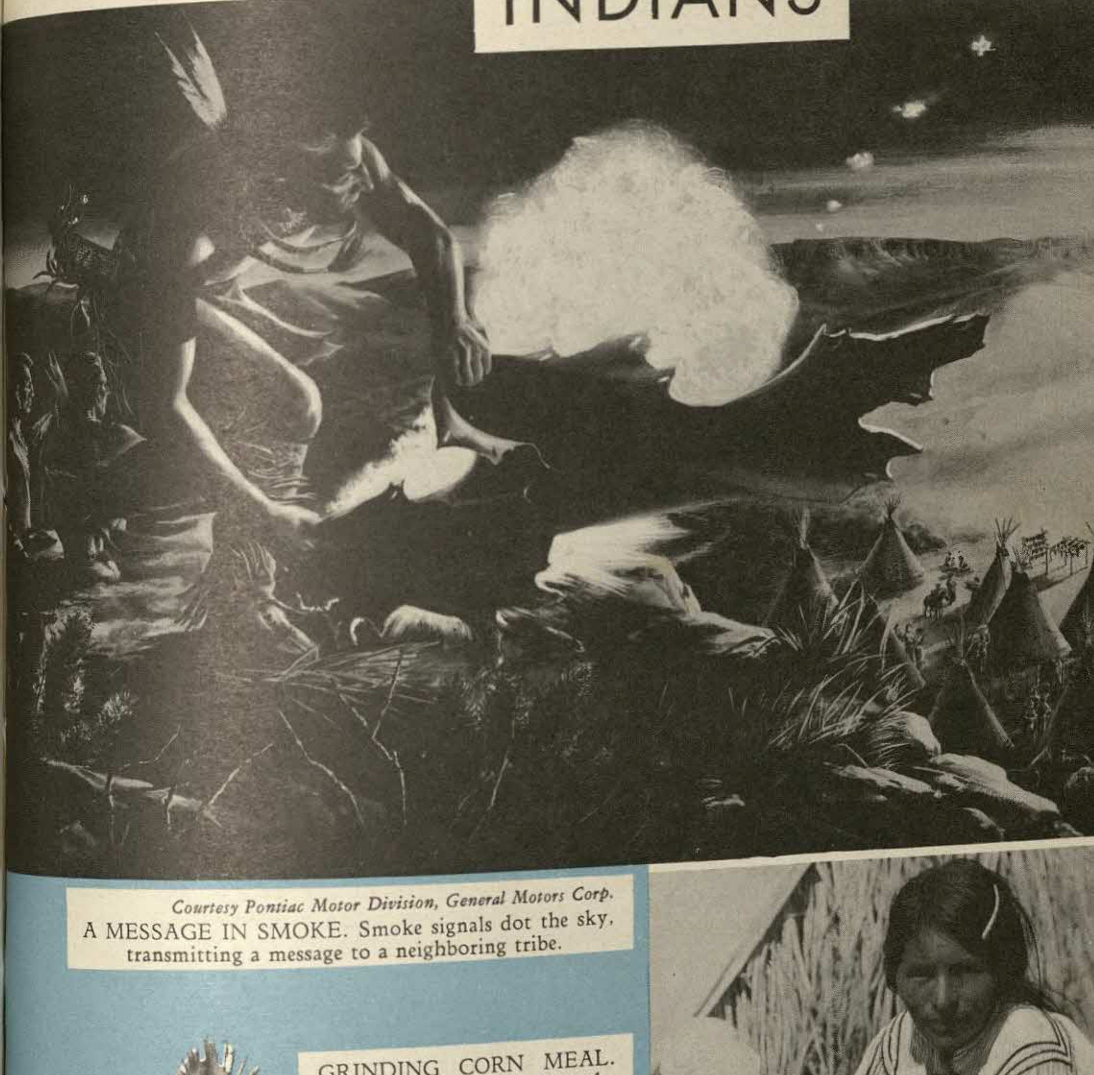
While the Pueblos were peaceful, the Apaches and Navahos were warlike; but they, too, have become sheepherders and artisans. Unlike the Indians of other sections of the country, the Indians of the Southwest still live much as did their ancestors. They dress, eat, and build houses just as did the Indians hundreds of years ago, and still follow their old tribal customs.

Along the Pacific coast, extending from the Columbia River to Alaska, are Indians who have always been expert fishermen. Living near the sea, these people built large canoes of cedar wood, and used them to travel far out to fish for halibut, salmon, and cod. To catch these fish they used nets and spears, and hooks made from bone and baited with smaller fish and other small animals. They also hunted whales with harpoons, and divided up the huge sea animals with their people, using the oil, fat, bone, and blubber for all sorts of purposes. Sometimes, however, they hunted the bears, goats, and other animals in the mountains, and gathered berries and herbs.

The cedar tree furnished wood for their stone-hewn houses and bark for mats, baskets, and even armor for the warriors. They also made utensils from this tree of all purposes. A warlike people, they were also deeply religious, worshiping, like other Indian tribes, a number of spirits. One of the most important of the spirits was that of the bear; and whenever an Indian of this region prayed for good fortune in hunting or war, he prayed to the spirit of the bear.

These Indians at first used only stone implements to cut their cedar logs, and this method was quite difficult. With the coming of the white men, however, they

A WONDERLAND ADVENTURE WITH INDIANS



Courtesy Pontiac Motor Division, General Motors Corp.
A MESSAGE IN SMOKE. Smoke signals dot the sky, transmitting a message to a neighboring tribe.

GRINDING CORN MEAL. Corn was a vital food to the Indians of the Southwest. An Apache woman (right) grinds corn kernels with a metate on another stone to make corn meal.

Santa Fe Railway
AN INDIAN HOOP DANCE. All Indian tribes perform interesting ritual dances. Left, a Jemez Indian of New Mexico does a complex hoop dance.

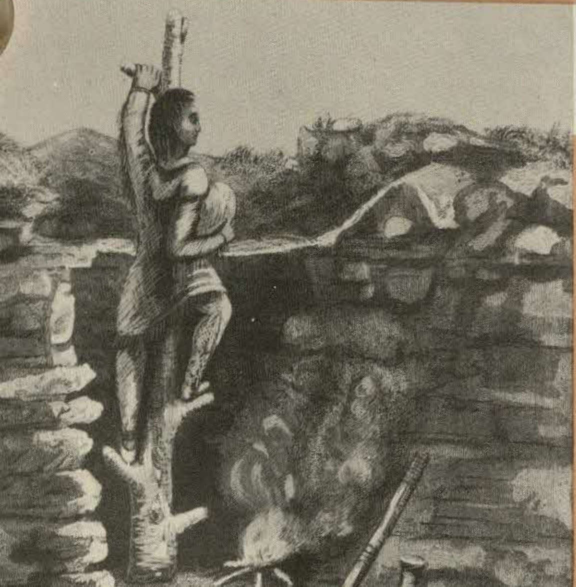
Library of Congress

PLAINS INDIANS HUNTED THE BUFFALO. Indians of the Great Plains depended on the buffalo for their livelihood. When the white man invaded the West, millions of buffalo were slaughtered, and the Indian was ruined.

AN INDIAN RAINCOAT. Left, a cape of seal gut and a basketry hat complete the rain outfit of a Northwest Coast Indian.

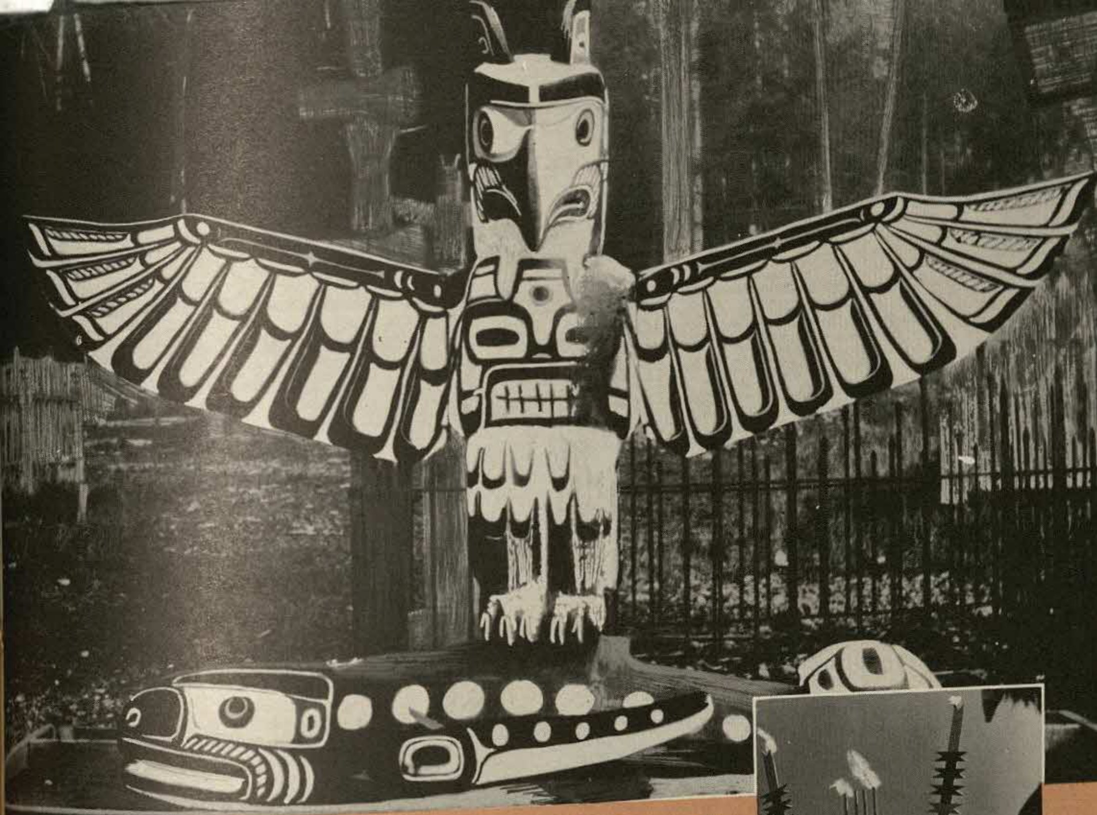
E. R. Squibb & Sons

POISONING AN ARROW. Above, some South American Indians make arrows more deadly by dipping the tips in poison syrup of the curare vine.



Library of Congress

INDIANS MINED COPPER. Indians living in the copper country of Michigan dug the precious red metal from the ground and hammered it into implements and utensils.

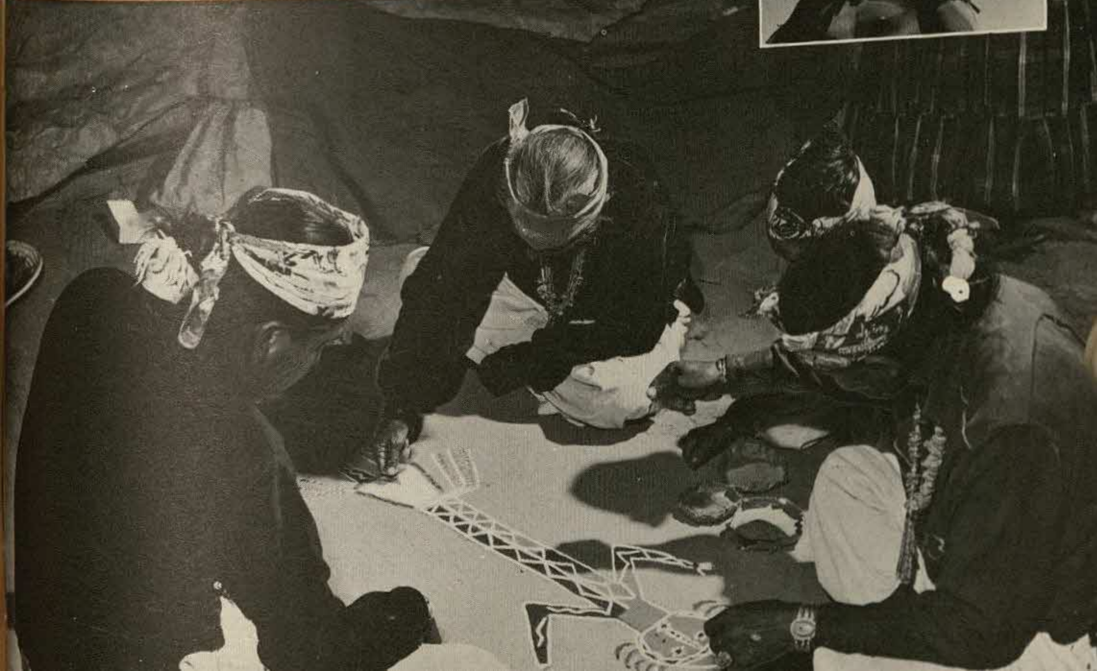


United Press; PAA; Santa Fe

MONUMENT TO A GREAT MAN. A giant bird perched on a whale marks the grave of a famous Northwest Coast Indian.

Right, AN APACHE FRIGHTENS THE DEVIL.

NAVAHOS MAKE A SAND PAINTING. Such a painting is always destroyed before sunset.



Pontiac Motor Div.; Hooker Electrochemical

A HAPPY FISHING GROUND. Indians of the Northwest Coast net and spear salmon.

SALT, AS PRECIOUS AS GOLD. Indians who lived in country where there was no salt were eager to bargain with other tribes for this precious seasoning.

Pontiac Motor Division, General Motors Corp.

HUNTING WITHOUT WEAPONS
Indians of the Great Plains hunted the buffalo for food and clothing. Shouting and waving their blankets, they drove the animals over cliffs to kill them. They also hunted with bow and arrow. Indians never killed more animals than they needed.

learned to use steel axes and knives, and they became expert woodcarvers. It became the custom of the Northwest Indians to set up a carved and painted cedar log in front of the house of each family. These logs were attractively designed to show the *totems* (or symbols) of the family, and gave rise to the familiar totem poles. This custom is dying out today, and these Indians, too, are becoming modern. Many of them are employed in the salmon canneries which line the coast.

The Indians Today. Although it was long felt that the American Indian would become a vanished race, the number of Indians is increasing. They are gradually becoming adjusted to changed conditions, and many are being educated in schools and institutions provided by the government. A few Indians, such as those who held land in Oklahoma, have become wealthy, and many have risen to positions of importance in business, politics, and the professions. The Indian Reorganization Act of 1934 raised the Indian's standard of living by setting up a $10,000,000 loan fund and a $2,000,000 annual fund for land purchase. In 1924 all Indians became citizens by an act of Congress, but it was 1950 before all the states allowed their Indian residents to vote.

The adjustment of the Indians to a life that is very different from the ways of previous generations has been aided by many Indian leaders, such as Many Lightnings, a Dakota Indian who saw that the old ways were gone forever and encouraged his people to adapt themselves to the new age. Education of Indians is being carried forward on the reservations located throughout the nation; and of course Indians may attend public schools and colleges just as anyone else. In fact, only half the Indian school children go to government schools.

It was President Grant who abandoned the practice of making treaties with the Indians, a practice which placed them in the position of being foreigners. The spirit behind his action has been perpetuated and, except for one recent treaty with the Seminoles of Florida, the policy in Indian affairs has been to treat the Indians as Americans who are eligible to the rights and privileges of all other people in the United States. Today, there are more than 520,000 Indians in Canada and the United States, more than half the estimated number inhabiting North America at the time of Columbus.

The more important tribes and Indian families are described in these volumes under separate titles.

INDIAN TER'RITORY. Much of the present state of Oklahoma is composed of land that was once Indian Territory, a region in which American Indians were permitted to live without interference from white men. The territory, set aside by act of Congress in 1834, was inhabited originally by Cherokees, Creeks, Chickasaws, Choctaws, and Seminoles; but later, as white men spread westward, other tribes went to live there. The red men living in this territory were allowed to form their own government and follow their ancient tribal customs while the government maintained schools and other institutions for them. The Territory became part of the Territory of Oklahoma in 1889, after most of the Indians had become citizens. Discovery of oil in the region made many of the Indians quite wealthy. See INDIANS, AMERICAN; OKLAHOMA.

INDIA RUBBER. See RUBBER AND RUBBER MANUFACTURE.

IN'DIGO. Used in coloring silk, cotton, and woolen fabrics as well as in the manufacture of calico prints, blue dye made from the indigo plant was once an important commercial product. Indigo dyeing was known in the Far East centuries before Christ, and the art was probably carried to Europe by Greek and Phoenician traders. Today most indigo dyes are artificial, made from coal tar. An herb of the pea family, indigo comprises many varieties of plants; the variety yielding the dye is native probably to India. See CALICO AND CALICO PRINTING; DYEING.

INDIGO BIRD, or INDIGO BUNTING. Sweet and canary-like, the song of the indigo bird is heard well into the late summer. It is one of the most brilliantly colored North American song birds. It is related to the sparrows and the finches, and is found in Eastern United States and in Southeastern Canada, wintering in Central America. The indigo bird is about five and a half inches long, and the male has a vivid-blue color all over its body, darker on the wings and tail, brighter on the back. The female is utterly different, being a shy, brownish bird of inconspicuous appearance.

Indigo birds live in bushy, brushy places like those haunted by the brown thrasher and the towhee. They build a nest of grasses and leaves a few feet from the ground, and lay three or four pale, bluish-white eggs.

INDO-CHINA. Jutting into the South China Sea is the peninsula of Indo-China. It includes Thailand (Siam), the Union of Burma, the Malayan Federation, and the Associated States: Cambodia, Laos, and Viet Nam (formerly French Indo-China). See BURMA; FRENCH INDO-CHINA; MALAY PENINSULA; SIAM.

INDONESIA. Before 1600 the riches of the East Indies lured bold European mariners to these beautiful islands between Asia and Australia. The Dutch, through the Dutch East India Company, gained control in 1602, and for almost 350 years the Dutch East Indies, as the islands came to be known, provided the Netherlands with valuable raw materials. But the people of the Indies longed to be free. After World War II they set up a republic, and in December, 1949, Queen Juliana of the Netherlands granted them their independence; New Guinea alone remained a Dutch possession. Under the constitution established in 1950, the Republic of Indonesia is governed by its own Cabinet and Parliament.

Indonesia, made up of thousands of mountainous, forested islands, has a total area of more than 583,000 square miles. Java, Sumatra, Bali, Madura, and a large section of Borneo are among the better known parts of the nation. Jakarta (formerly Batavia) on the island of Java is the capital. The islands stretch across the equator. Temperatures are high, and the rainfall is very heavy. Crops of rice and other foodstuffs flourish. Large plantations produce copra, rubber, tea, coffee, sugar, spices, and maise. Indonesia's underground wealth includes petroleum, coal, bauxite, tin, copper, gold, silver, nickel, and manganese. Native handicrafts are numerous, and industrial development, begun with foreign capital, has continued to grow in importance.

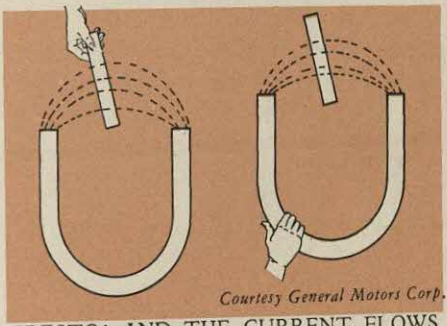
Most of Indonesia's 86,900,000 inhabitants are Malayans of the Moslem faith. Java and some of the other islands are among the most densely populated regions on earth. But there are also great jungle areas inhabited only by wild beasts and tropical birds. Some of the people are highly civilized, but others are primitive in their customs. See also BORNEO; CELEBES; JAVA; MOLUCCAS; SUMATRA; WORLD WAR II.

INDUC'TION, ELECTRIC. In electricity, induction is the electrification of a body, or the production of an electrical current in a body, by means of the nearness of another charged body, without actual contact.

Static Induction. If an iron ball is charged with positive electricity, the space surrounding it is in a state of electrical strain. If another iron ball be brought within the region of strain, it, too, will be electrified. That is, the negative electrons in its composition will be drawn to the side nearest the first ball, the reverse side remaining positively charged. If the second ball is connected for a moment with the earth (so that the positive charges are transferred to the earth) and then, while insulated, removed from the electrical region of the first, it will be negatively charged throughout.

Induction of this sort takes place during thunderstorms. The high electrification of clouds induces a charge in the earth below. Lightning rods are for the purpose of allowing this charge to escape so that there will not be a sudden, violent interchange of electricity between earth and cloud.

Induced Currents. The induction of electric currents is a natural phenomenon of very great importance, for it makes possible the dynamo and the magneto which manufacture electricity; the electric motor, which puts electric power to work; the transformer, which makes it possible to transmit electricity at high voltage and use it at low voltage; the telephone; the induction coil which we use in the automobile motor and other gas engines; and apparatus for the wireless telegraph and telephone. The disturbance of a magnetic field is the cause of current induction, as will be seen by reference to the articles INDUCTION COIL; DYNAMO.

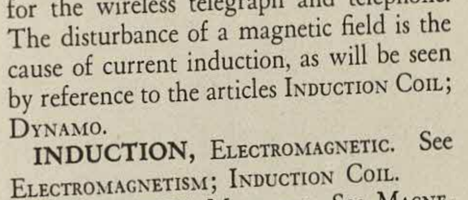

Courtesy General Motors Corp.

PRESTO! AND THE CURRENT FLOWS
Electricity is produced when a conductor is moved across magnetic lines of force. The process is known as induction.

INDUCTION, ELECTROMAGNETIC. See ELECTROMAGNETISM; INDUCTION COIL.

INDUCTION, MAGNETIC. See MAGNETISM.

INDUCTION COIL. Automobile and other gasoline engines have an attachment commonly called the *spark coil,* a unit in the ignition system. This unit is an induction coil and its function is to convert a relatively weak battery current into current with a pressure of several thousand volts.



THIS STEPS UP VOLTAGE
An induction coil. *A,* core; *B, C,* primary and secondary coils; *D,* interrupter; *E,* battery; *F-H,* spark gap.

Within the coil box an insulated wire from the battery is wound round and round a cylinder of soft iron and connected with the ground. This wire is the *primary* coil. Another wire, from the cap of the spark plug of the cylinder, is wound outside the first and also grounded. This is the *secondary* coil. (The negative plate of the battery is also connected with the ground, through the timer, and the lower end of the spark plug is directly grounded. The ground is a conductor of electricity, and for this reason makes both primary and secondary coils complete electrical circuits.)

When the timer closes the primary circuit, a current of electricity passes through the primary coil, and makes the iron ore a magnet. When this current is again shut off, the disturbance of the magnetic field causes a sudden current through the secondary coil. If the secondary wire passes around the core more times than the primary, the induced current is of greater voltage than the battery current. Roughly, if the secondary has ten times as many turns, it will have ten times the voltage.

The basic principle of the induction coil is the same as that of the transformer, by which electric current may be given a high voltage for transmission over a power line and be reduced again for use.

Induction coils are also used in medical work, and in telephones and wireless telephones to increase the distance that they will transmit sound. Some radio receiving sets have coils, some do not.

INDULGENCE, *in dul'gens.* According to the Roman Catholic religion, sinners must pay a penalty in Purgatory for their sins, unless they secure an indulgence, or remission of such a penalty. The sin itself can be forgiven only by God, but the Church may lessen the severity of the punishment. The Church maintains that it may do so because Christ and the saints have already given satisfaction to God for the sins of all mankind, and that man, therefore, is allowed to share this satisfaction. There are two types of indulgences, the *partial* and the *plenary,* the latter being complete remission of the penalty for sin. In partial indulgences, the Church shortens the time a sinner would have to spend in Purgatory.

In ancient times, penalties were very severe, indulgences were much sought after, and the practice was often abused. This misuse of the power was one of the important factors which led to the Reformation. Indulgences now are usually obtained by prayer, fasting, giving alms, and visiting holy shrines, but they may be granted at any time by a Catholic prelate.

IN'DUS. From the remote fastness of Tibet, the mighty Indus River flows southward through Northwest India. The wide river, ranking in importance with the Ganges in the east, empties into the Arabian Sea through a delta 125 miles wide. In the Sind province, a great dam, known as the Sukkur Barrage, has been constructed, permitting 5,000,000 acres of former desert to be transformed into cotton and wheat fields.

INDUSTRIAL REVOLUTION. Until the coming of that great transformation we call the Industrial Revolution, the manufacture of goods was an individual and unhurried manner of living. Men engaged in the making of finished products from raw materials were craftsmen. They worked in their own shops with one or two apprentices and ran their business according to the rules of their guild and their conscience. They were concerned more with furnishing the goods needed by their own community than they were with the needs of people at a distance. Every town had its own cobbler, silversmith, weavers, miller, blacksmith, and carriage maker.

But in the latter part of the eighteenth century, this system began to change. The great voyages had opened up new lands for trade. People were demanding more things to wear and eat and use. The making of goods changed from the home to the factory; and men, instead of being independent, worked for other men in these factories. As a result, the production of goods speeded up, and the tempo of the world became faster.

In addition to the automobile, radio, telephone, electric light, telegraph, ocean liner, streamline train, fine clothing, better housing, and general comforts of living that the Industrial Revolution eventually

John Hancock Mutual Life Insurance Company

DREAMERS HELPED REVOLUTIONIZE INDUSTRY

When American products began to roll from the assembly line, it was partly because Eli Whitney dreamed of independence from imported materials. He tinkered with a little wooden box and a spool of brass wire and they became the cotton gin. He tinkered with gears, levers, and rolls of drawing paper until they became the basic pattern of today's mass production.

brought to the world, it also brought hardship and misery. Laws did not keep pace, and men, women, and children worked long hours in factories for low wages. They lived in overcrowded slums and stood at looms in poorly lighted and ventilated rooms.

The Industrial Revolution, begun in England, was presaged by an agricultural revolution. The farmers in England in the first part of the eighteenth century produced only enough for themselves and the surrounding region. Poor transportation prevented produce being transferred from one district to another. Then, wars on the continent brought a great demand for food, and scientific improvements were made in farming. Transportation was improved; more was grown and sold; and farming assumed large-scale proportions.

Manufacturing also began to change. In 1770 James Hargreaves patented the spinning jenny, permitting one man to spin several spools of thread at once. Richard Arkwright, inventor of the spinning frame, built mills powered by horse and water.

Then came the most important invention, the practical steam engine to power the looms, pull trains, and move boats. The results were a further increase in goods, development of iron and steel industry, mining of coal for fuel, and England's start in the race for world trade. The cotton gin, invented in 1793 by American Eli Whitney, was another great labor-saving device for mass-production.

England's inventions eventually came to America and then America started on the same road England was following.

There are no definite time limits to the Industrial Revolution. In England the change from agriculture to manufacturing came in the eighteenth and nineteenth centuries. In America, Germany, and France it took place in the nineteenth century.

Consult the following titles for additional information:

Arkwright, Richard
Factory and Factory Legislation
Invention
Spinning
Steam Engine
Textile
Weaving

INERTIA, *in ur' she a.* We know that it is impossible to start an automobile at full speed. The speed must increase gradually. We know, also, that it is impossible to stop a swiftly moving automobile suddenly. The speed must decrease gradually. In both cases we observe the effect of a force opposing our attempt to start or stop the car. This force is due to the inertia of the automobile. Inertia is the tendency of a body to remain in a state of rest, or in motion in a straight line. It is the basis of the first law of motion stated by Sir Isaac Newton about 300 years ago.

All matter possesses inertia, and the greater the amount of matter, the greater the inertia. The heavier the load, the harder it is to start and the more difficult to stop. Note that inertia is the cause of the resisting force, and not the force itself, and that it manifests itself only when there is a change in the state of motion of an object.

Illustrations of the principle of inertia are encountered every day. We stamp our boots to get rid of snow or mud. The boots stop when they hit the doorstep, but the snow or mud flies on because of its inertia. We shake an apple tree and apples fall, because they continue the motion we have started. Inertia makes possible the churn and the cream separator.

Besides these examples of the tendency of moving matter to keep moving in a straight line, we can find plenty of examples of the tendency to remain at rest. If we jerk a string it breaks more easily than if we pull on it, because in the jerk we do not overcome the inertia of the first part of the string, and the force of our pull is not felt by the far end of the string.

The engineer trying to start a long string of loaded cars matches his own wit and the power of steam against the inertia of the train. If all the couplings are tight, the inertia of the whole train has to be overcome at once, and the locomotive may fail to start the train. The engineer backs up enough to loosen all the couplings. He can then start the cars one at a time. See MOMENTUM; MASS; MATTER.

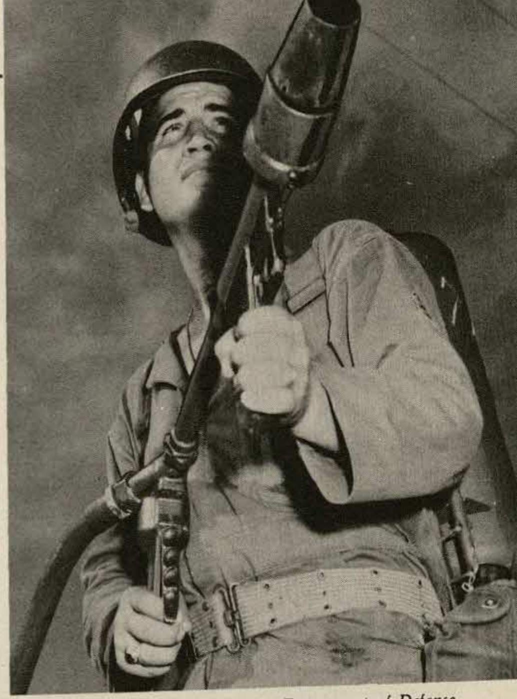
IN'FANTRY. Although powerful, long-range guns and efficient, speedy aircraft have been developed for modern warfare, the infantry, made up of foot soldiers, still forms the "heart" of a nation's war forces. Its importance lies in its ability to change positions easily and quickly.

The principal change in the infantry from ancient to modern times is in the method of attack. The phalanx, a solid line of soldiers several files deep, was a favorite device in Roman and Greek times. Because much of the fighting was hand to hand, the system was effective, and an important military science grew up about the phalanx. However, it has been abandoned because it now results in heavy losses. In modern warfare, with its tanks, long-range artillery, and bombing planes, the infantry must advance in open formation rather than in solid masses. Discipline and initiative are necessary in the foot soldier, since he is frequently separated from his commander in battle.

In modern "blitzkrieg" tactics, infantry travels largely by fast motor transport. Such *motorized* units, however, should not be confused with *mechanized* forces, since the infantry, upon reaching the objective, must dismount and fight on foot.

INFECTION, *in fek'shun.* Diseases caused by harmful parasitic organisms which enter the body are classified as infections. Such entrance is especially effected in certain parts of the body, as the membranes of the nose and throat, the tonsils, the roots of the teeth, the walls of the alimentary canal, and the skin. The body is protected against its microscopic enemies by two lines of defense, of which the external one is the skin, and the internal one is the mucous membranes of the air passages and alimentary canal. See GERM THEORY OF DISEASE.

INHER'ITANCE TAX. As a means of raising revenue, governments have long taxed property received by legacy, or inheritance. In the United States, not only does the Federal government levy such a tax, but all the states, except Nevada, also have such duties. There is much variance in the details of inheritance-tax laws, but most of them have the same basic features. The tax rate is usually progressive; that is, the larger the inheritance becomes, the higher is the rate of the tax. The Federal tax in the United States ranges from one per cent to seventy per cent, depending upon the size of the estate.



Department of Defense

A WELL-EQUIPPED INFANTRY

This flame thrower can fire a stream of burning jellied gasoline up to 60 yards.

The effect of the inheritance tax on the economic life of a nation has been much debated. Those who favor the tax argue that it is a necessary source of revenue, in view of the extension of the work of the government. They also argue that the concentration of vast fortunes in the hands of one or a few persons is undesirable and that such a tax divides the total wealth of a country a little more equitably among the people.

Opponents of the tax have long argued that the tax destroys the incentive to work and build up a fortune, since so much is eventually taken away by the government. They also consider that the tax decreases charitable bequests, since a high tax rate leaves too little of the estate to the family, and thus there is no surplus which might be given to charity. See INCOME TAX; TAX; ESTATE.

INITIATIVE, *in ish'i a tiv.* In government, initiative is the principle whereby laws may be suggested, passed, and put into effect by the people without respect to the lawmaking body. However, in most jurisdictions the lawmaking body has its legitimate part in initiative legislation.

Sometimes a state legislature refuses to act on a popular demand for a certain law. In such case (where the initiative is a legal weapon), the people by action of five to twenty-five per cent of the voters may file in the office of the secretary of state a petition for the law sought, in the exact language desired; it must go before the legislature without change, for legislative approval or disapproval.

If it is passed it becomes a law when it is signed by the governor. If it is rejected, there is no further action possible in some jurisdictions, but in others there is provision for a vote on the matter by all the people; if the proposal receives a majority of all the ballots cast, it becomes a law without further reference to the legislature. Not even the governor, in such a case, is able to thwart the popular will by the exercise of the veto power.

The initiative is closely allied to the referendum. See REFERENDUM.

INK. Four thousand years ago when, so far as we know, ink was first used, every writer undoubtedly mixed his own writing fluid. He was therefore interested in the materials used in the making, but today the purchaser of writing ink is concerned only with the results it will produce. His best guide is the name on the bottle; reliable companies always make reliable ink.

Fountain-pen inks, in all colors, usually contain an aniline dye, and some are instant-drying due to an alkaline solution. Invisible or sympathetic ink keeps writing secret until it is exposed to heat, chemicals, or ultraviolet light. An SOS written in lemon juice was sent by the captain of the USS Philadelphia during the Barbary Wars. For public records, wills, and other documents where permanence is important, ink that is guaranteed to endure should be chosen. For drawings which are to be photographed, waterproof India ink is the best.

Most writing ink is a combination of a tannic decoction with a solution of copperas. Printing inks, which are of a syrupy consistency, are made of various pigments and a linseed-oil base. The ball point pen, a twentieth century invention, contains its own reservoir of ink.

INLAND REVENUE. See INTERNAL REVENUE.

INNESS, *in'is,* GEORGE (1825-1894). Painting nature as he saw it, George Inness, one of the greatest of the American landscape painters, brought to his canvas studies of nature which were not so much faithful reproductions of landscapes as they were "first impressions" of what the artist felt and saw when he looked at nature. In this respect Inness followed the *Impressionists,* artists who painted scenes as they saw them, emphasizing light and brilliant color rather than form. Although Inness in his earlier career had leaned toward the school of the Barbizon painters such as Corot, who tried to show the motion and life in nature, his best works are done in the Impressionistic style. Some of his work is distinguished by a soft, charming effect, as in *American Sunset, Georgia Pines,* and *Niagara.*

The artist was born in Newburgh, N. Y., and went to Paris in 1854 to study. Returning to America, he lived for a time in Brooklyn and later in Medfield, Mass., where he painted *Medfield Meadows.* Internationally honored, Inness was elected to the National Academy and the Society of American Artists; and in 1867 *American Sunset* was chosen as an example of American art for a Paris exhibition.

IN'NOCENT. Of the thirteen Popes of the Roman Catholic Church who chose the name Innocent, these five were the most important:

Innocent I, Pope from 402 to 417, upheld and extended the complete authority of the Roman bishop over all Catholic Church authorities. In this effort he upheld Saint John Chrysostom, who had been exiled as the Bishop of Constantinople without a hearing.

Innocent II, elected in 1130, was not fully recognized as Pope until 1138. A division in the College of Cardinals had resulted in the election of two Popes—Innocent II and Anacletus II. Innocent was recognized by France, Spain, England, and the German emperor, Lothair III. After Anacletus died, in 1138, Innocent called the Lateran Council of 1139, which brought peace in the Church. Innocent died in 1143.

Innocent III, the greatest of the Popes of this name, reigned from 1198 to 1216. He brought the Papacy to its peak of temporal power by the boldness of his worldwide activities. He settled the dispute over the imperial succession in Rome and ended the war between France and England. He sent missionaries to Prussia and started a crusade against the Albigensians in France. He organized the Fourth Crusade but excommunicated its leaders when they set up a Latin empire in Constantinople. Innocent called the Fourth Lateran Council in 1215.

Innocent XI, an energetic reformer, became involved in a bitter quarrel with Louis XIV of France over the king's practice of appropriating Church revenues, his persecution of Protestants in violation of the Edict of Nantes, his insistence that it was the royal right to appoint bishops, and his efforts to nationalize the Church in France. He was Pope from 1678-1689.

Innocent XII, a charitable and pious man, was Pope from 1691 to 1700. He brought about a reconciliation with France and forced the French churchmen to retract those views which had denied the authority of the Roman Pope.

INQUISITION, *in kwi zish'un*. During the latter part of the Middle Ages, the Roman Catholic Church organized the Inquisition, a series of ecclesiastical courts for the trial of heresy. These courts had jurisdiction over Catholics and backsliding Catholics alone, and in time came to be very powerful because of the close connection between the Church and state. Such courts still exist, but no longer have as much power as the Inquisition.

Under the organization of society as it was then, heresy was as much a crime against the state as it was against the Church; the Church had power only to *try* the accused, who was then turned over to the state for punishment. The fact that the state prescribed death as the usual punishment is indicative of the fact that at that time heresy was a crime equivalent to anarchy and high treason.

Trials were conducted in secret, but an accused person had the right to name his enemies so that they could not testify against him. The heretic was first urged to forsake his heresy, and only the relapsed or unchangeable heretics were at last found guilty and turned over to the state for punishment. The commonest punishment ordered was a pilgrimage to a holy shrine, with the yellow cross worn as a sign of disgrace.

Courts of the Inquisition were established in all of the leading countries of Europe. Much has been written of the Spanish Inquisition. While it is true that torture was resorted to in many cases, this phase of the court's work has been greatly exaggerated. Nevertheless, the Spanish court has been condemned by both Catholics and Protestants as unnecessarily cruel. Although the Spanish Holy Office began as an ordinary court similar to those in other countries, Ferdinand and Isabella of Spain soon took complete charge of it. In 1480 it became a state court with the approval of the Spanish Cortes.

From this time it gradually developed as a powerful weapon in the hands of the royal family. The Pope was powerless to stop it, since the court had passed completely out of his control. The work of the court continued until 1808, when it was suppressed. Revived again during the Restoration, it was permanently abolished in 1834.

In the meantime, the regular courts of

the Holy Office continued their work in other lands. Less severe than that in Spain, they attracted less attention. The body still exists as an office of the Catholic Church, but its main function now is the suppression of articles and books dangerous to faith and morals. It keeps the famous *Index Expurgatorius,* a list of publications which Catholics are forbidden to read.

After the principles of the Church had been defined in the Nicene Creed, Constantine, emperor of Rome, became one of the guardians of the doctrines of the Church, punishing the dissenting Arians and Donatists. The successors of Constantine as well as other rulers co-operated to prevent heresies. During the twelfth and thirteenth centuries, the Church was again threatened with heresy among the Waldenses and Albigenses, and the authorities established the Holy Office. Drawn from the order of Dominican monks, the members of the Inquisition, with the exception of those in Spain, were under the direct control of the Pope. Judged in the light of its own times, the good points as well as the faults of the Inquisition can be more clearly seen.

INSECTICIDES, *in sekt'i sidez,* **AND FUNGICIDES,** *fun'ji sidez.* Growing crops, gardens, trees, and vegetables have no greater enemies than the various insects and fungi which attack them in the growing season. Destroying these pests is not always an easy matter, but they are usually eliminated by applying poisonous insecticides and fungicides to the plants.

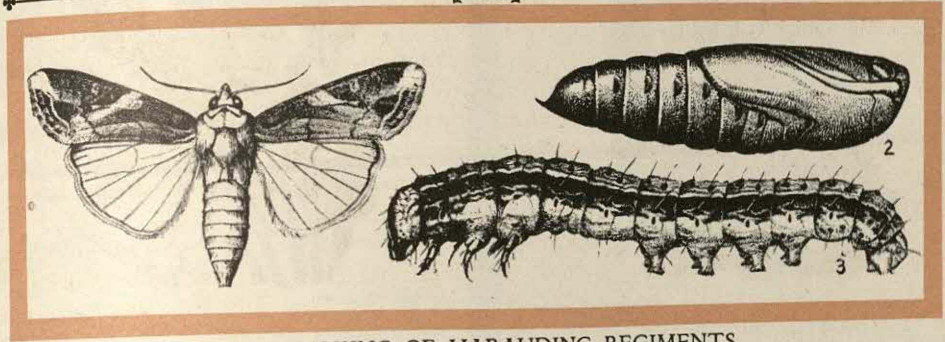
Insecticides. Because insects are of two general classes, the chewing and sucking varieties, insecticides must be designed to kill each type. The chewing variety is best controlled by spraying or dusting the plant with a stomach poison that kills the insect; the sucking variety (such as plant lice), by contact insecticides that enter the breathing pores or corrode the insect's body covering. Lead arsenate, calcium arsenate, and magnesium arsenate are effective in treating the chewing insect; while the sucking varieties are best handled by applying contact insecticides such as nicotine sulfur, oil emulsions, lime-sulfur, and chlorinated hydrocarbons, including the potent DDT. Fumigants are efficient against all types of insects. Hydrocyanic gas, sulfur, chlorobenzene, and methyl bromide are among the commonly used fumigants.

Fungicides. Fungi are of two types, those that grow on the inside of a plant and do not show on the outside until they mature, and those which develop on the outside of the plant. The fungicide must be designed to kill the particular fungus present. Among the most common fungi are mushrooms, toadstools, puffballs, rust fungi, corn smut, and potato and apple scabs. The most effective fungicides are formaldehyde, bichloride of mercury, copper compounds, and sulphur mixtures. These are usually sprayed or powdered on the affected part.

Applying Insecticides and Fungicides. All insecticides and fungicides must be carefully mixed and applied. If too strong a mixture is used, the plant will be killed. Usually a fine spray distributed evenly over the plant will wipe out the pest. Apple trees are commonly sprayed with Bordeaux mixture (a dilute solution of copper sulphate and lime). Apple trees should be sprayed just after the blossoms fall. Dusting and spraying is done by hand or by high-pressure machines. Airplanes and helicopters often do large scale dusting.

IN'SECTS. At all times and in many ways, man is affected by insects. They pester his body and endanger his health. They attack his animals. They damage his crops and fruits and dwelling places. On the other hand, one insect, the honeybee, supplies him with food, and another, the silkworm, gives him material for costly clothing. Again, were it not for insect life there probably would be few fruits and food crops, so important is the work some species do in carrying pollen. And some forms help to control others.

The stories of the lives of insects are among the most interesting in nature. Because of this and because of their impor-



THE MAKING OF MARAUDING REGIMENTS

When on the march, fall army worms are among the worst of crop menaces. The worms are one stage in an insect life cycle. (1) The moth which develops from the worm. (2) Pupa in which transformation takes place. (3) The worm itself, actually the larva of the insect.

tance to our welfare, we should know something of the insects common to our localities.

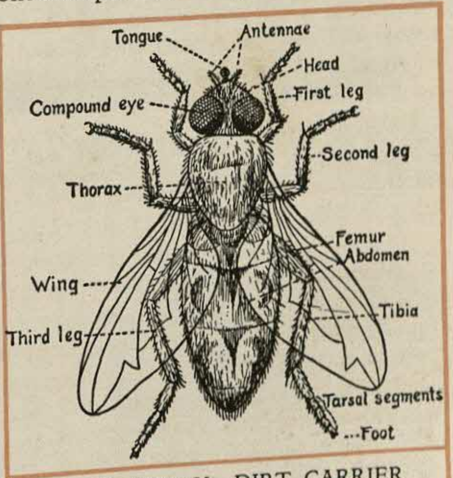
What Is an Insect? An adult insect is most easily identified by the number of its legs. It is the only animal which has six legs and no more. This definition excludes spiders (which most of us have considered insects) because they have eight legs, and excludes also the centipedes and millipedes, the mites and ticks, and the crabs and crawfish. But all these latter are near relatives of the insects and have certain characters in common with them. In all, the skeleton is outside the body rather than inside, and is made up of ring-like parts, or *segments.* Certain features of their internal structures are similar also. Taken together with the insects, they constitute the branch or order named *Arthropoda,* which means *jointed feet.*

Insect Structure. An insect has the segments of its body arranged in three groups. The first, consisting of one segment only, is the head. On this are found the eyes, the structures which serve as a mouth, and the feelers, or *antennae.*

The eyes are of two kinds, simple and compound. The first are small and probably of little value to the insect. The others are made up of a great number of simple eyes, sometimes as many as 50,000, which, when seen under a microscope, have the six-sided shape of the cells in honeycomb. Often these compound eyes take up most of the space on the head.

The mouth is made up of several different parts. In an insect of simple structure, these are seen to be an upper lip, a lower lip, and two pairs of jawlike structures which work from side to side in chewing. In other insects these parts are changed so as to form, in some way, a tube for sucking liquids. This tube is often able to pierce plant tissues or the skin of animals. Thus, there are two general types of mouths in insects, the chewing type and the sucking type. These mouth characters are of great value in determining the classification of different forms, and the methods of controlling them.

The second division of the body is the thorax. It is made up of three rings or segments which frequently appear to be one solid part. Each segment bears one pair



THE HOUSEFLY—DIRT CARRIER

Cabbage Looper

WORMS. The cabbage looper chews cole crops, such as cauliflower, kale, and kohlrabi. The similar cabbage worm hatches from eggs laid by a tiny white butterfly.

Gladiolus Thrips

THRIPS. Tiny thrips hide between the petals of vegetables and ornamental plants, and whiten and deform the plants.

BEWARE OF THESE COMMON INSECT PESTS

Red Spider Mite

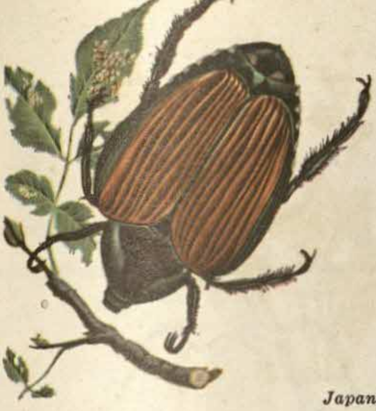
MITES. Midget members of the spider family, they have eight legs instead of six. To find them, look closely under leaves or at bronze-colored foliage.

Codling Moth

FRUIT WORMS. Eggs laid by the codling moth hatch into worms that tunnel into the core of the fruit. They harm the quality of the product.

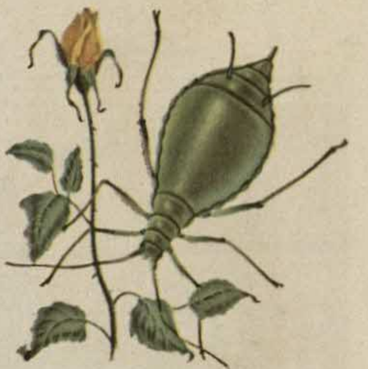
NIGHT FLYING INSECTS. Mosquitoes, moths, and other night fliers are pests for outdoor pleasure on porch or patio on a warm summer evening.

FLIES. One of the most common pests around the house, the patio, livestock and stock barns, and garbage cans is the housefly.



Japanese Beetle

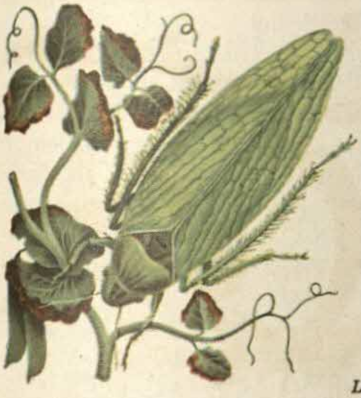
BEETLES. Japanese beetle winters as a grub under the lawn, and ruins ornamental plants in summer. Many kinds of beetles chew flowers, vegetables, and fruits.



Aphid

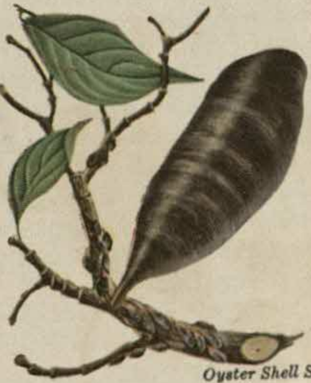
APHIDS. These tiny insects, called plant lice, are probably the most common garden pest. They have a soft body and no wings.

HARMFUL TO PLANTS, HOMES, AND ANIMALS



Leafhopper

LEAFHOPPERS. These species attack practically everything that grows. They spring off or run sideways whenever they are disturbed.

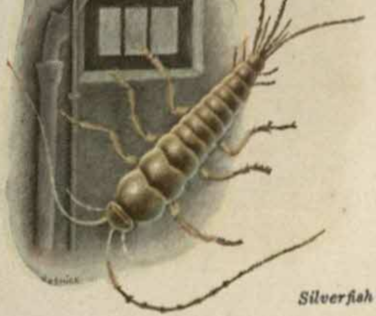


Oyster Shell Scale

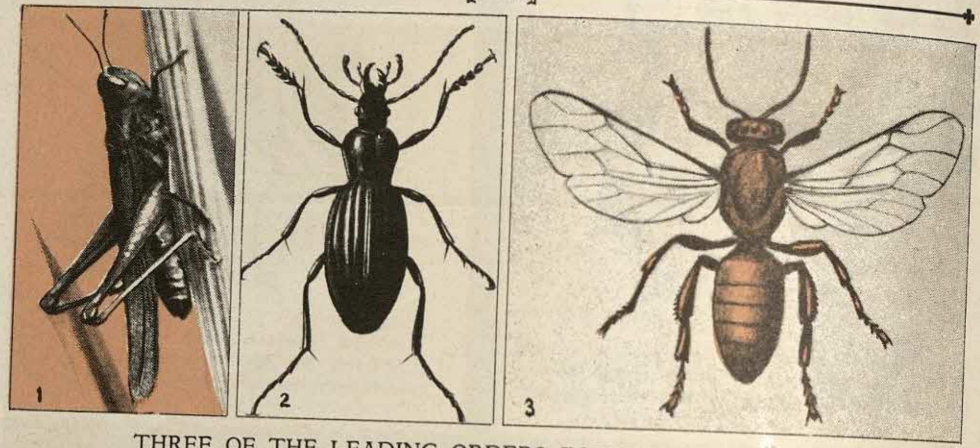
SCALES. Scale insects pick a spot and dig in. They disfigure fruit, leaves, and limbs, and feed on the plant's juices.

INSECTS ON PETS. Savage biters, such as fleas and lice, carry diseases and keep house pets and other animals scratching and unhappy.

INDOOR PESTS. Silverfish, ants, and roaches are unwelcome visitors. The silverfish hides in warm places and eats wallpaper and bookbindings.



Silverfish



THREE OF THE LEADING ORDERS IN THE INSECT WORLD
Insects fall into seven major groups, or orders, some having many thousands of species. (1) Chief representative of the *Orthoptera:* the grasshopper, major crop menace. (2) Carabid beetle, a species of *Coleoptera.* (3) Stingless bee of the order *Hymenoptera.*

of legs, and when wings are present, as is usually the case, they are attached to the second and the third of these rings.

The third part of the body is the abdomen. It has a variable number of segments and does not usually have any appendage, although some insects have tail-like structures on the end of the body and others have special organs for depositing the eggs in the soil, in plant tissues, or in other animals.

Along the sides of the abdomen, and sometimes in the thorax as well, is a series of small openings. These are called *spiracles,* and are the holes through which the insect breathes. They open into tubes, called *tracheae,* which carry the air directly to all parts of the body. Many substances used to kill insects do so by entering through these openings and killing the body tissues within.

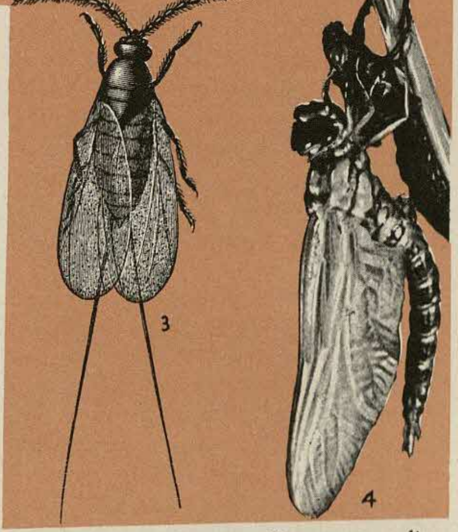
Another interesting fact about the internal structure of the insect is that it has no blood vessels, except a long tube in the upper part of the body which serves as a heart. The blood is taken in along the sides of this and is forced out at the front end. All parts of the body not filled with the organs are filled with blood, which the heart merely serves to keep agitated so that it will carry the food to the different organs. It also carries from these organs the waste materials. The blood of insects is colorless or of a greenish tint.

Still another internal structure which is greatly different from that in higher animals is the nervous system. There is no brain. A long double cord runs the length of the body on the lower side of the body cavity. There are thickenings at intervals along this cord, and from these thickenings the nerves branch out, going to all parts of the body segment in which the thickening occurs. Each one of these thickenings of the nerve cord may be likened to a small brain serving that part of the body. There is no one nerve center which seems to have control over the others.

Insect Numbers. Insects are the most numerous of all land animals, the actual number of individuals, even in a restricted area, being beyond estimate. The number of species or different kinds which have been described and given names exceeds 500,000, and it is estimated that there exist at least four times this many and perhaps as many as 10,000,000 kinds. The number of kinds certainly far exceeds the number of all other kinds of animals put together.

In variety of forms, likewise, there is almost no limit.

Classification. For convenience in study, insects are arranged, according to similarities in structure, into orders, families,



AND THE OTHER FOUR
(1) Member of the order *Lepidoptera*, which includes moths and butterflies. Their larvae eat crops. (2) The highly unsanitary housefly, representing the order *Diptera*. (3) *Hemiptera*, meaning *half wing*, usually called bugs. This is the male of the cochineal scale. (4) The brilliant dragon fly, an example of the *Neuroptera*.

and other groups, the final group being a species and consisting of forms which are, practically speaking, identical.

The main orders of insects are *Neuroptera* (netted wings), including stone flies, May flies, dragon flies, and caddis flies; *Orthoptera* (straight wings), which includes grasshoppers, crickets, katydids, cockroaches, and the less common walking sticks and mantids; *Hemiptera* (half wings), insects without wings or with two or four wings, including the true bugs, lice, aphids, and scale insects; *Lepidoptera* (scaly wings), including butterflies and moths; *Diptera* (two wings), including the two-winged flies; *Coleoptera* (sheath wings), the beetles; and *Hymenoptera* (membrane wings), which includes the bees, wasps, ants, ichneumon flies, sawflies, and chalcid flies. There are also a number of less extensive orders.

Life History of Insects. Insects in their development from the egg to the adult undergo various changes which are usually spoken of as a *metamorphosis*. In some groups the changes are not complete, while in other groups they are so distinct that one stage does not resemble one preceding or following it.

For one example, the egg of a grasshopper produces a creature which, except for the absence of wings, resembles the adult. This form, known as the *nymph*, is the growing stage. It sheds its skin, or *molts*, several times before it develops into a grown grasshopper. Such an insect passes through incomplete changes. Grasshoppers, chinch bugs, and dragon flies belong to this type.

On the other hand, the egg of a moth hatches into a caterpillar, or *larva*, which is the active, feeding stage, or the stage in which the insect does its serious injury to plants. The caterpillar sheds its skin several times before it is fully grown. When full-grown it spins a casing of silk, known as a *cocoon*. In this protective casing it transforms into the third stage, which is called a *pupa*. This is the inactive, or *dormant,* stage of its development, and in this stage it takes no food.

The pupa does not resemble the caterpillar from which it came nor the moth into which it will later develop. In many cases the insect passes the winter in this pupal stage, which, therefore, varies in length from a few days in summer to several months in winter. Finally, the shell splits open and the adult emerges with wings which are soft and limp, but which expand and harden in a few hours. The forms of the insect in these stages are so different that without experience or knowledge gained from study one would not know that they belonged to the same individual. Such an insect undergoes distinct or complete changes. Butterflies, beetles, houseflies, bees, and ants belong to this type.

Insects and Man. Insects cause an enormous loss in property injured and destroyed. The best authorities agree that their injuries to farm crops alone equal at least ten per cent of the value of the crops. This heavy loss is so constant that few realize the total damage, which in America is now more than a billion dollars annually. Even our own health and comfort are affected by insects that are carriers of human diseases and that are continual torments.

Consult the following titles for additional information:

Ant
Aphides
Bee
Beetle
Boll Weevil
Bug
Butterfly
Cankerworm
Caterpillar
Chinch Bug
Chrysalis
Cicada
Cockroach
Cricket
Death's-Head Moth
Dragon Fly
Firefly
Flea
Fly
Gnat
Grasshopper
Gypsy Moth
Hessian Fly
Hornet
Insecticides and
 Fungicides
Jigger
June Bug
Katydid
Lace-Winged Flies
Ladybird
Larva
Locust
Louse
Mantis
May Fly
Metamorphosis
Mosquito
Moth
Potato Bug
Scarab
Scorpion Fly
Silkworm (see Silk)
Stag Beetle
Termites
Tsetse Fly
Tussock Moth
Walking Stick
Wasp
Water Beetle
Water Bug
Weevil

INSIG'NIA. When soldiers parade down the street, we look at their insignia—the ornaments on their shoulder straps and collars and the chevrons on their sleeves—to discover their rank. Thus, insignia are marks or badges which show office or authority. Civil, military, and religious groups, as well as clubs and societies of all kinds, have certain badges or banners by which they are recognized. These are their insignia.

In the proper sense, military insignia consist only of distinguishing marks on the uniform of a soldier. The first-known use of insignia occurred during the Second Crusade, when the French soldiers wore a red cross on the sleeve to distinguish them from the English, who wore a white cross. Bright, highly ornamented insignia and uniforms were commonly used in Europe during the period between the seventeenth and nineteenth centuries. Realizing the disadvantages of such costumes, modern armies have substituted a drab uniform which blends with the surroundings and protects the soldier from attack.

Until 1861, the American soldiers copied the conspicuous uniforms and insignia, but by the time the United States had entered World War I most of the present insignia had been adopted. In the United States Army, the insignia on the shoulder strap designates the rank of an officer, and the lapel ornament, the branch of the service in which he serves; the sleeve chevrons indicate the rank of non-commissioned officers. Service stripes are worn below the elbow, and each division has insignia worn at the top of the left sleeve.

When a soldier in the regular army becomes a second lieutenant, he is given one gold bar on his shoulder strap. The next in command above is the first lieutenant, who wears one silver bar. As he moves up another rank, he is given the two silver bars of a captain; next the gold oak leaf of a major. The silver leaf of the lieutenant colonel is followed by the silver eagle of the colonel. One silver star is the badge of the brigadier general; two silver stars, the major general; three silver stars, the lieutenant general; four silver stars mark the full general; and five silver stars, general of the army. The various branches of the service are indicated by the lapel insignia.

In the American navy, rank is indicated by sleeve stripes. The admiral of the fleet has one stripe of two-inch braid with four one-half inch stripes above it. An admiral is marked by one two-inch stripe with three half-inch stripes above; a vice-admiral, by one two-inch stripe and two half-inch braids above; a rear admiral, by one stripe of two-inch braid with one half-inch stripe above it; a commodore, one two-inch stripe; a captain, by four half-inch stripes; a commander, by three half-inch stripes; a lieutenant commander, by two half-inch stripes with a quarter-inch stripe between them; a lieutenant, by two half-inch stripes; a lieutenant (junior grade), by one half-inch stripe, with a quarter-inch stripe above it; and an ensign, by one half-inch stripe. Various ornaments indicating rank are worn on the collar and cap. See Army; Navy.

IN'STINCT. All orioles build a hanging, basket-like nest automatically and without being taught; such a response, or way of doing a thing, is an instinct, inherited from ancestors and not learned. All the lower animals have instincts. Among them, the insects exhibit instincts most clearly. For example, certain species of insects make many preparations for their young whom they never live to see. The same trait is shown in generation after generation in the same way.

Man, according to some biologists, also has instincts. The problem of proving the existence of instincts is more difficult in this case, however, since man has the ability to reason and draw conclusions, a capacity which the lower animals do not have. This makes it difficult to distinguish between what man has learned by experience and what he may have inherited as an instinct. For example, some scientists claim that a child will instinctively grasp objects with its fingers; while others maintain that a baby must learn, or be taught, to grasp. There is no general agreement among scientists, therefore, as to whether or not man does possess instincts. At the present time, such evidence as we have does not seem conclusive on either side.

INSULATOR, *in'su la tur.* In winter we wear woolen clothing because heat does not pass through it as readily as through our summer, cotton clothes. We cover electric-light wires with rubber and cotton because little electricity passes through them. The wool and the rubber and cotton surround us and our wires as the sea infolds an island; so we call them insulators, from the Latin word *insula,* meaning *island.*

Electric Insulators. Good insulators are important in all electrical installation, for they prevent losses due to leakage of current to the earth, into which all electricity seeks to escape. Asbestos, mica, sulfur, rubber, oils, waxes, resins, plastics, glass, and porcelain are efficient insulators. Rubber compounds are flexible insulating devices. Some silicones offer almost 100 per cent insulation. See Electricity.

Heat. Fur, felt, and wool have tiny air cells or fibers that prevent the escape of heat by convection currents. Fibers made of glass, metal foil, and laminated papers are modern home insulators that reflect the heat rays in or out, depending on the season.

Sound. The same porous, inelastic materials that shut in heat also insulate sound, transferring sound energy into heat.

INSURANCE, *in shoor'ans.* The protection of oneself, loved ones, and property is a problem which concerns almost everyone. Insurance, in a sense, provides this protection by paying, with money, for the loss of life or property. It is reasoned that accidents may occur to anyone's property at some time, but not to all persons at one time. It naturally follows that by co-operative savings and a common fund, carefully invested, for protection, each person has to contribute less than if he set up his own fund.

There are two general types of insurance companies—the *mutual,* based on a common fund in which all the contributors are shareholders who divide equally the cost of operation and the payments; and the privately owned *proprietary,* or *stock,* companies. The latter organizations have a certain capital stock which is invested; and the stockholders, who are not necessarily policyholders, receive interest on their investment.

Social Advantages of Insurance. Insurance helps to maintain morale in the family, community, and business. Men are able to work and their families are able to live more securely when the fear of the economic consequences of death or disaster is removed. Business houses are able to carry greater stocks of merchandise, invest more capital, and give greater service when they realize that their investments are secure. No longer are whole communities financially ruined by fire or other disasters.

History of Insurance. Insurance does not seem to have existed before the early marine insurance of the fourteenth century. In 1684, the *Friendly Societies,* of a mutual character, were founded in Great Britain. At that time, also, private companies were in existence. Industrial insurance, corresponding somewhat to the modern personal insurance, had its beginnings in the guilds of the Middle Ages. However, the earliest recorded life-insurance policy was issued in 1583 in England, but the first life-insurance company was not founded until sometime later. In 1759 the first American company was established. By that time insurance protection for property and life was receiving wide acceptance.

Life Insurance. One of the values placed on human life is earning ability. It is this earning power upon which families are dependent. Death destroys this present and future value; but, through life insurance, it is possible to guard against this great loss. The growth of this form of insurance has been so great that today Americans invest $8,000,000,000 a year or 4 per cent of their income in life insurance.

Life insurance is divided into three classes: *life,* or *straight life; term;* and *endowment.* In the ordinary life policy, the individual pays premiums until a certain sum has accrued or until he dies. Upon his death his family or others, called *beneficiaries,* receive the amount of money specified in the policy. Before a policy is issued, the applicant must first meet the requirements of a medical examination.

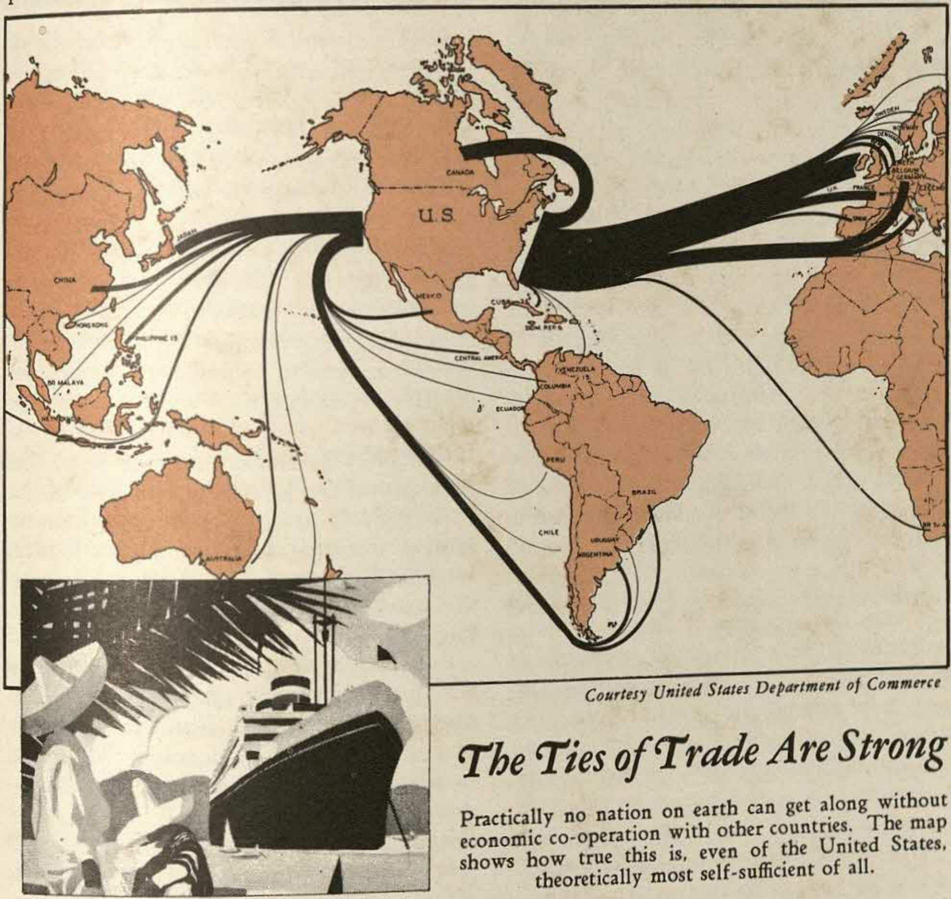
Term insurance is for pure protection without savings or investment and is in force for only a specified number of years. It is often taken out by business men to protect their interests in case of death.

Increasingly common, particularly among young people, is the endowment, or savings, form of insurance. The company agrees to pay at the end of a certain period of time (ten, fifteen, or twenty years) to the insured, or sooner to his beneficiary if he dies, a definite sum of money.

By means of statistics on average length of human life and the expectancy of death within a given age group, insurance companies are able to estimate the likelihood of deaths during the coming year and in this way budget their rates and estimate their expenditures. However, if a person should die the day following his first premium payment, the full amount would be paid to his beneficiary.

Fire Insurance. One of the most expensive but desirable forms of protection is fire insurance. The underwriter sets up the fire-prevention and building specifications which have to be met and charges according to the risk involved. As a rule, heat alone is not sufficient claim for damages unless there is an actual fire on the premises. However, damage caused by water in putting out a fire usually falls within the provisions of the insurance.

Other Insurance. Other forms of insurance include accident, health, hospital, unemployment, old-age, automobile, and marine insurance. See LLOYDS; OLD-AGE PENSIONS; WORKMEN'S COMPENSATION.



Courtesy United States Department of Commerce

The Ties of Trade Are Strong

Practically no nation on earth can get along without economic co-operation with other countries. The map shows how true this is, even of the United States, theoretically most self-sufficient of all.

INTERDEPENDENT WORLD. Like members within one family, citizens within one community, states within one nation, and the nations of the world are dependent on one another for survival. Their chains of transportation, communication, and commerce have so closely linked them together that never again will a country satisfactorily be able to erect a wall about itself as did China in the third century. What politically happens in one country affects the markets and prices of other countries almost instantaneously; for, regardless of who rules a country, its markets must remain open for both purchase and sale. Actions such as aggression, high tariffs, colonial monopoly, and control of gold breed discontent, poverty, jealousy, and war. Once war was concerned with fame, glory, and conquest. Today it is largely economic, reflecting the wants of individuals and nations.

Economic Aspects of the World Today. Discontent in the modern world is due to many factors. One of the principal factors is that a few nations control most of the land and resources of the world, while many of the most powerful and populous nations do not have the necessities for supporting themselves. What these handicapped nations have in the way of resources cannot be conveniently sold because of the tariff walls separating them from major world markets, walls erected by the almost self-sufficient nations who seek to sell all they can abroad without buying in return. In a world which is of necessity interdependent, each nation nevertheless fears to become dependent on another; fears that in time of war it will not be secure.

Because of the limitations of climate and natural resources, few nations are capable of both producing and manufacturing all the goods they need. Then, too, because of available capital and educational background, some nations are better equipped to produce or manufacture certain articles more cheaply and efficiently than others. In other words, almost every nation must buy as well as sell, and some must do more of one than of the other. The logical solution for economic inequalities, then, would be for nations to co-operate, each doing the job for which it is best fitted, even as people in a community work together.

Authorities in international affairs see hope for future peace and prosperity only through such international co-operation between large nations and small ones, between creditor nations and debtors, between those which have land, resources, and wealth and those which have not. Peace and security can only be attained when all nations recognize the rights of all to a fair share of the world's goods.

Consult the following titles for additional information.

Fascism
Foreign Trade
Free Trade
International Law
Nazism
Tariff

INTEREST. The sum paid for the use of money is interest. The amount exacted as interest bears a fixed ratio to the amount loaned, and is to be paid at certain specified times, as annually, semi-annually, quarterly, or monthly. The sum loaned is the *principal;* the sum paid for its use is *interest;* the fixed ratio is the *rate per cent.*

Legal interest is the rate per cent that can be charged according to law, for in most states legislation has been passed to prevent extortionate interest rates; a rate greater than the legal rate is called *usury,* and is variously treated (see USURY).

Simple interest is interest paid for use of the principal sum only; if not paid when due, it does not, like the principal, then draw interest. However, when there is an agreement that unpaid interest shall be added to the principal and become a part of the principal sum, then interest runs upon the interest as well as upon the original principal. This gives rise to what is called *compound* interest. In partial payments on principal sums, a payment must first be applied to cancel interest due, the remainder applying to reduction of the principal.

INTERIOR, DEPARTMENT OF THE. The Secretary of the Interior, a member of the President's Cabinet, presides over this executive department created March 3, 1849. It deals chiefly with matters concerning the domestic welfare of the people of the United States.

The Department of the Interior includes the Bureaus of Indian Affairs, Land Management, Mines, and Reclamation; Fish and Wildlife Service; Geological Survey; National Park Service; Bonneville, Southwestern, and Southeastern Power administrations; Alaska Railroad; Alaska Road Commission; Virgin Islands Corporation; Board on Geographic Names; Oil and Gas, Power, Land Utilization divisions.

The National Park Service has charge of the Capitol building and grounds, as well as all national parks, monuments, battlefield and historic sites, cemeteries, and recreational demonstration projects.

Certain hospitals and institutions in the District of Columbia are under the jurisdiction of this department. The Secretary of the Interior receives a salary of $25,000 a year.

INTERLAKEN, *in' tur lah ken.* Between lakes Thun and Brienz in Switzerland is the beautiful town of Interlaken. It is situated on the River Aar, twenty-six miles southeast of Bern. In the heart of the Bernese Alps, a region of magnificent scenery, Interlaken is a world-famed goal of tourists. The municipal government offices are housed in an old castle. The population of Interlaken is about 4,000.

INTERNAL-COMBUSTION ENGINE. See GAS ENGINE.

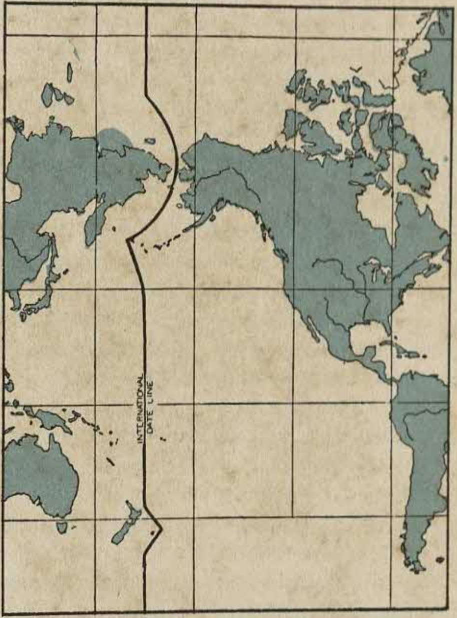
INTERNAL REVENUE. Taxes levied by national governments on articles and people within a country come under the general classification of internal revenue. With but few exceptions, up until the twentieth century the United States government depended largely on import duties or customs. However, as the demands on government became greater and additional income was needed, taxes on various articles used by the people were adopted. Levies on alcoholic liquors, tobacco, legal papers, playing cards, and amusements yield considerable revenue. Other sources are: manufacturers' excise taxes on utilities, gasoline, and appliances; retailers' excise taxes on jewelry and furs; and gift and estate or inheritance taxes. A tax on commodities may take the form of a stamp affixed to an article, or it may be a direct sales tax.

In 1913 a national income tax was passed to supplement other forms of internal revenue. National necessity (such as caused by the depression of the 1930's) determines the raising or lowering of existing taxes and the fixing of new taxes.

In Great Britain and its possessions, this type of taxation is called *inland revenue.* See INCOME TAX; TAX.

INTERNATIONAL DATE LINE. Halfway around the world from Greenwich, England, is an imaginary line extending partly along the 180th degree of longitude. This is the international date line, which, for purposes of time reckoning, determines today, tomorrow, and yesterday.

Should a person sail from the United States for China, he will lose a day when he reaches this line, in so far as the calendar is concerned. For example, if it is Saturday to him when his boat reaches the line, the day becomes Sunday as soon as the ship crosses it. But, upon the traveler's return, he gains a day; and if he reaches the line on Sunday, he crosses into Saturday. Thus, an eleven-day trip from San Francisco to Shanghai will be twelve days according to the calendar; while the return voyage would show ten days on the calendar.



PROFIT AND LOSS IN DAYS
Because time is determined by the earth's turning, the International Date Line fixes days.

The imaginary line is necessary because time is not the same throughout the world. The rotation of the earth on its axis from west to east causes a difference in sun time between places at different meridians. The earth is divided into twenty-four time zones, one for each hour of the day. Thus, the first time zone is immediately east of the line, and the twenty-fourth is immediately west. The line does not exactly follow the 180th meridian from Pole to Pole. It deviates to cut through the middle of the Bering Strait, and veers west to avoid cutting through the Aleutian Islands. It then is drawn diagonally eastward to the 180th meridian, and extends along it to a point south of the equator, where it veers southeast to 172°30′W., 15°30′S.; from there it turns southwest to the 180th meridian again, and follows it south. These variations are made to include groups of islands in the same time zones. See LONGITUDE AND TIME.

INTERNATIONAL LAW. The body of rules and principles which are, or ought to be, observed among nations is known as international law. Unlike ordinary law, it is not enacted by legislatures, but is made by treaties, decisions of international courts, and by the work of world organizations like the United Nations. There are two divisions of international law, *public* and *private*. Public law deals with the relations between sovereign states, as though they were individuals. Private law is concerned with the rights of individual citizens within other states.

Many people wrongly believe that peace movements and international law are similar. Rather, international law is the codification of rules, indicating how nations should act when they are at peace, how they should act when at war, and how the position of neutral nations should be affected by war.

A Dutch scholar, Hugo Grotius (1583-1645), is recognized as the father of modern international law, and his writings and similar ones which contain the practices long established by custom are the accepted authorities. At Aix-la-Chapelle in 1668 the leading nations upheld international law as the keystone of international relations.

Since 1899, steps have been taken to codify the principles of international law. At the Hague Conferences in 1899 and 1907, the first extensive rules on war, peace, and neutrality were formulated and agreed upon by the major world powers. The League of Nations, the Hague Court of Arbitration, the World Court for International Justice, and, more recently, the United Nations were established to substitute arbitration, based on international law, for armed conflict. Let us consider some of the major rules. In peacetime:

1. All nations are independent and sovereign.
2. All nations are equal, regardless of area, wealth, or population.
3. Each nation has sole authority over its property, citizens, and the waters washing its shores for a distance of three miles out to sea.

During time of war:

1. The subjects of enemy states are enemies.
2. Citizens retain rights to their property, regardless of a change of rulers.
3. Contraband is subject to seizure.
4. Prisoners and the wounded must be treated humanely.

Neutrals in time of war:

1. Shall have their territory untouched.
2. Shall not use their land to aid belligerents.
3. Shall not have their commerce interfered with.
4. May shelter any belligerent vessel which seeks aid.

It was inevitable that such laws should develop as states became more closely associated with one another in commerce, communications, and diplomacy. Most civilized nations recognize the existence of international law and agree to abide by it. After the close of the First World War, real efforts were made by many nations to settle disputes by arbitration; and this trend was climaxed by the signing, in 1928, of a pact outlawing war.

Unlike ordinary law, however, international law has no police to enforce it but depends upon the integrity and honor of nations. Unforeseen economic and national problems arose after World War I which resulted in a gradual disregard of certain principles of international law, and a weakening of the instruments by which these principles were upheld. The instruments of commercial embargoes, for example, imposed against Italy during the conquest of Ethiopia, had little effect; and the League of Nations failed entirely in an attempt to settle the undeclared war begun in 1937 between China and Japan.

Following this period, as totalitarian nations embarked upon an era of conquest, disregard for international law became general. Treaties were abrogated and small nations were absorbed; whole populations were moved from one nation to another; independent peoples were ruthlessly destroyed. The climax of this era was the beginning, in 1939, of the Second World War, in which the contestants, engaged in a struggle to the death, either would not or could not observe international laws.

For example, Germany overran Denmark, Norway, Luxemburg, Holland, and Belgium in an attempt to gain supplies and strategic position. The Allies instituted contraband control of all shipping, and invaded territorial waters of neutrals to perfect the blockage against Germany. Some neutral nations voluntarily surrendered many of their rights.

The reader should understand, however, that this situation demonstrated only the failure of the instruments for enforcing certain international laws. To correct this weakness, the framers of the United Nations gave that organization power to use force, if necessary, to insure world peace. A unique development, after World War II, was the trial under international law of persons charged with war crimes.

INTERNATIONAL PEACE CONFERENCE. See PEACE CONFERENCE, INTERNATIONAL.

INTERSTATE COMMERCE ACT. In 1887 the United States Congress passed the Act to Regulate Commerce, now known as the Interstate Commerce Act, which created the Interstate Commerce Commission. The authority of this body has been strengthened and its jurisdiction broadened by additional legislation enacted from time to time. The Commission consists of eleven members, all appointed by the President. A chairman who serves for one year is selected by the members themselves. The term of office is seven years and the salary of each commissioner is $12,000 annually. The regulation of interstate commerce in the public interest is the general purpose.

The act originally provided for jurisdiction of the Commission over common carriers engaged in transportation of persons or property wholly by railroad, or partly by railroad and partly by water when both are under a common management. Later there were added express companies, pipe lines, (except for water and gas), sleeping-car companies, and motor carriers.

The Commission is an independent body, being subject to the control of Congress. It has authority to establish fair and uniform passenger, freight, and express rates in interstate traffic, and to designate rates for mail transportation by railways, electric carriers, and airplanes. It hears and adjusts grievances against carriers or shippers, receives and examines formal complaints coming within its jurisdiction, and may bring offenders before the United States courts for trial by reporting violations of the law to the Attorney-General of the United States. These are among many other numerous and varied activities.

INTES'TINE. Comprising an important part of the alimentary canal, the small and large intestines are muscular tubes leading from the stomach and continuing the conversion of food into nourishment for the body, the process known as digestion. Approximately twenty feet in length and from one to one and one half inches in diameter, the small intestine is coiled in the central part of the abdominal cavity and is divided into the *duodenum, jejunum,* and the *ileum*. The latter enters the large intestine, five feet in length and one and one-half to two and one-half inches in width, and is divided into the *cecum, colon,* and *rectum*. Rhythmic contractions of the muscular walls, called *peristalsis,* move the food through the intestines.

The small intestine is attached to the stomach, and the valve which controls the opening between the two is called the *pylorus*. This valve permits small quantities of food to enter the small intestine, whose interior surface has many folds which contribute digestive juices and permit the food to be retained until all its di-

Courtesy Lewis Foundry and Machine Co., Pittsburgh

gestible elements have been absorbed into the blood. Waste material, liquids, and indigestible food are passed into the large intestine, where some water and whatever remains of the digestible food are absorbed. Through muscular action it expels the waste. See DIGESTION.

INTRACOASTAL WATERWAY. Little known but widely used is the Intracoastal Waterway, a passage from New York to Florida that permits boats of light draft to travel up and down the Atlantic coast over few stretches of open water. It consists of a route through the sounds and rivers lying along the Atlantic coast, connected by canals, bays, and inlets. The Federal government operates and maintains the waterway, having dredged and straightened it. The route is completely toll-free.

One section of it, known as the Florida Passage, makes use of the Indian River in Florida and the inlets and bays of Georgia. This route was used by the Spanish galleons of old. In the latter part of the nineteenth century, the route was completed by private companies and state administrations. It is used mostly to ship freight by barge from the south to the north and by fishing boats. The Gulf Intracoastal Waterway provides similar passage from the tip of Florida to Corpus Christi, Texas.

WHEELS AND BRAINS OF PROGRESS
The world moves forward with scientific invention: product of mind plus plenty of hard work.

INVEN'TION. Man has one great advantage over the rest of the animal kingdom in the fight to survive—an ability to reason and think, which gives him the power to create new and original things, or inventions. Every nation encourages and protects invention because in the long run it is of benefit to everybody in the

History-Making Inventions

Rocket	c. 1200	Chinese	Resulted in space vehicles in 1950's.
Movable type	c. 1450	Gutenberg	Made possible the printed book, basis for all modern learning.
Improved telescope	1609	Galileo	The telescope opened a hitherto unexplored field of astronomy.
Barometer	1643	Torricelli	The barometer now makes possible accurate predictions of weather which are of inestimable value to agriculture and shipping.
Steam engine	1763	Watt	The first practical steam engine. It revolutionized the manufacturing process, and made possible the steamboat and the railway locomotive.
Spinning jenny	1764-67	Hargreaves	Made factory production of cloth possible. It could spin ten threads at once.
Power loom	1785	Cartwright	Made possible mass production in the cloth industry, which inspired similar inventions in other fields.
Cotton gin	1793	Whitney	This invention resulted in increasing the production of cotton and making the industry important. The United States became the world's leading producer of cotton.
Electric motor	1831	Faraday	Faraday's experiments with electromagnetic induction made possible the dynamo and later applications of electrical power.
Reaper	1831	McCormick	Revolutionized farming and furthered the growth of large farms.
Telegraph	1837	Morse	Provided a quick and easy method of communication and had a profound influence on the development of trade.
Sewing machine	1845	Howe	Aided in the production of clothing on a large scale, and also reduced household drudgery.
Bessemer process	1855	Bessemer	Laid the foundation for all modern production of steel, and gave the world materials strong enough for large-scale structures such as skyscrapers.
Gas engine	1876	Otto	Provided the necessary power element for the development of the automobile and airplane.
Telephone	1876	Bell	Made possible quick, instant communication at great distances.
Incandescent electric light	1878	Edison	One of the most widely used of all modern inventions.
Gas automobile	1887	Daimler	The invention of the automobile was the beginning of a new era in modern life, resulting in the fine roads which now provide easy transportation between cities.
X-ray machine	1895	Roentgen	An important advance in medicine's fight against disease.
Wireless telegraphy	1895	Marconi	Made communication across long distances possible, provided ships with contact with land stations, and laid the foundation for radio broadcasting.
Airplane	1903	Wright brothers	The most significant advance in the history of travel.
Atomic Energy Power Plant	1953	Many	Harnessing the power of the atom tapped an enormous source of energy.
Solar Battery	1954	Many	First successful device to convert sunlight into electricity.

group. For example, among the powers granted to Congress by the United States Constitution is the right to enact patent laws.

Man's first inventions were concerned with the problems of food, shelter, protection, and warmth. He invented clothing and learned to chip and shape axes, arrows, and harpoons from stone. Fire enabled him to invent crude dishes and to make serviceable weapons from copper and iron.

By the time man reached the historical period, about 4000 B. C., he turned his attention to the world about him. He developed language and an alphabet from the signs of the primitive man and the word pictures of the Egyptians. The wheel and axle and pulley helped him move heavy loads. Fighting equipment was improved and the caveman's club gave way to gunpowder and the catapult. These gradually developed into the ancient blunderbusses and cannons, the forerunners of our modern artillery.

During this period, scientific thought grew rapidly. Experiments with the steam engine were made, the Egyptians developed a science of astronomy, and the Arabs laid the foundations for mathematics. The clock, the calendar, and the week appeared. Early architects were enabled to build higher and more beautiful buildings with the arch.

The most important period in the history of invention followed the Industrial Revolution which began about the middle of the eighteenth century. Man now turned his inventive genius to industry and toward providing comforts and luxuries. During this time, inventions made life easier in all its phases. In the home, electricity, sewing machines, and furnaces created a comfort which previously had been unknown. The development of the steam engine resulted in swift and efficient trains and ships, which made possible the enormous expansion of the United States and the opening of the West. The telephone, telegraph, and radio brought people all over the world closer together.

Commercial invention on a large scale began with the power loom and the steam engine, which heralded the beginnings of large-scale factory production.

The number of inventions constantly increases because man builds up a background of knowledge and culture which gives him greater opportunity to invent and more knowledge on which to start. In 1790 only three patents were granted by the United States Patent Office. In more recent years, over 40,000 patents have been granted. Since the National Research Council was founded in 1916 the uncovering of scientific miracles has not been left to chance or individual sleuthing but has been organized on a mass production scale. Scientific progress is encouraged and genius is incubated in hundreds of laboratories sponsored by industry or the government. The Atomic Energy Commission and the U.S. Army and Navy carry on vast research programs. Since 1952 the United States has invested $3,000,000,000 annually in research.

The last century has produced more inventions than all other centuries combined. The last hundred years has brought us proof of the germ theory of disease, the discovery of the electron with its chain reaction, and advances including the electron microscope, automation, motion pictures, and even the vacuum cleaner, the electric iron, and the first practical fountain pen. In 1930 penicillin, television, jet planes, nylon, dacron, home freezers, and nuclear energy were merely ideas or blueprints.

Scientists predict that the future will outdo fiction through the use of solar energy, nuclear energy, and electronics. By 1980, the skies will be as crowded as highways, but helicopter traffic will be electronically controlled. Planes, cars, and ships will run for indefinite periods without refueling. Transoceanic pilotless planes will deliver mail and passengers. Man can look forward to an increased life of leisure.

INVERTEBRATES, *in vur'te brayts,* or **INVERTEBRATA,** *in vur te bra'tah.* Those animals which lack a backbone, or spinal column, are classified by zoölogists as invertebrates. *Invertebrata* is the scientific name of this large branch of the animal kingdom. It includes protozoans, sponges, sea anemones, corals, jellyfish, worms, insects, shellfish, and other forms among the lower animals. See ZOÖLOGY.

IODINE, *i'o din,* or *i'o dine.* Bernard Courtois, a French chemist, in 1812 discovered iodine in the ashes of the seaweed known as kelp. As an efficient antiseptic and disinfectant, it has proved to be one of the greatest aids of medical science in the prevention of infection. In crystalline form, this chemical element has a deep blue-black color, but it is most commonly seen as a yellowish-brown liquid, called *tincture of iodine.* There is also a colorless preparation in liquid form.

Although a poison, iodine is occasionally given internally in the treatment of certain glandular diseases such as goiter, but usually is administered in the form of a compound such as potassium iodide. An ointment is also made from iodine for the external treatment of such disorders. Iodine is used also in laboratories as a test for the presence of starch, it is valuable in photography and in dye manufacture, and is used in the preparation of iodoform, a powder-like substance sometimes used in dressing wounds.

The name is derived from the Greek word for *like a violet,* because the vapor has a rich violet color. Iodine is found in sea water and in animals and plants which live in the sea; the commercial supply is now derived chiefly from the Chilean saltpeter deposits.

I'ON. When an electric current is passed through a solution of common salt (which is chemically sodium chloride), small particles of sodium begin to move in one direction, small particles of chlorine in the other. Each of these tiny particles is known as an *ion,* from a Greek word which may be translated *traveler.* Each bears an electric charge, the sodium ion a positive charge, the chlorine ion a negative charge (see ELECTRICITY; ELECTROLYSIS). Similarly, any other liquid containing a compound substance of which one element is electrically positive and another electrically negative may be split up into positive and negative ions. Thus a solution of copper sulphate divides into positively charged copper ions and negatively charged sulphate (sulphur and oxygen) ions.

In the ionization of a solution, the matter which travels toward the anode, or positive pole, is called the *anion.* That which travels toward the cathode is the *cathion.* The anion is the negative portion (because it is attracted by the positive electrode). See CHEMISTRY.

IO'NIA. In the eleventh century B. C., Greek settlers from Attica migrated to the seaboard of Asia Minor and founded Ionia. In this productive country, they established twelve cities and set up an independent confederacy which also included the nearby islands of Samos and Chios. Trading and agriculture made them a prosperous people, but eventually Ionia lost its independence and became the province of Alexander the Great and, later, of the Roman emperors. Ionia was completely wiped out by the Saracens, and only a few ruins now remain to mark the Ionian civilization. See GREECE.

IONIAN ISLANDS. Scattered through the Ionian Sea, the Ionian Islands were annexed by Greece in 1864. Although mountainous, the islands have many small, fertile plains along the shores. Important exports include currants, wine, salt, and oil, but there is also some foreign trade in textiles and ornaments. The islands had belonged to Venice from the Middle Ages until the end of the eighteenth century. Independent for a time, they were later under first French and then British control. The population is about 228,000.

IONIC ORDER. See COLUMN.

I'OWA. Lying in the heart of the Central Plains region of the United States, between the Mississippi and the Missouri rivers, is Iowa, the "Hawkeye State," where "the tall corn grows." Its area is 56,280 square miles, and the fertile farm state has a population of about 2,764,000. Although there are

Ewing Galloway

GOVERNMENT OF THE TALL-CORN STATE

Iowa's impressive capitol building is located at the state's largest city, Des Moines.

many other states that are larger and have greater populations, no others are better endowed with rich, fertile soil and productive farms, which make Iowa a rich agricultural state.

Land and Rivers. Iowa is a typical prairie state with rolling land that slopes gradually to the southeast. This vast expanse of gently rolling land was formed by the glaciers that covered most of the Middle-Western United States centuries ago. However, in the northeast corner of the state is the rugged Driftless Area, which the glaciers left untouched, and here are many deep valleys carved out by wind and rain.

The drainage system of Iowa is divided into two parts. The rivers in the western portion of the state flow into the Missouri River; those in the larger, eastern section drain into the Mississippi. The largest river in the state is the Des Moines, which, with the Turkey, Wapsipinicon, Skunk, and Iowa, drains into the Mississippi. The principal Missouri tributaries include the Little Sioux, the Nishnabotna, and the Nodaway. Although many of these rivers are navigable for small boats, little use is made of them. Northern Iowa has many beautiful small lakes, which were carved out by the retreating glaciers.

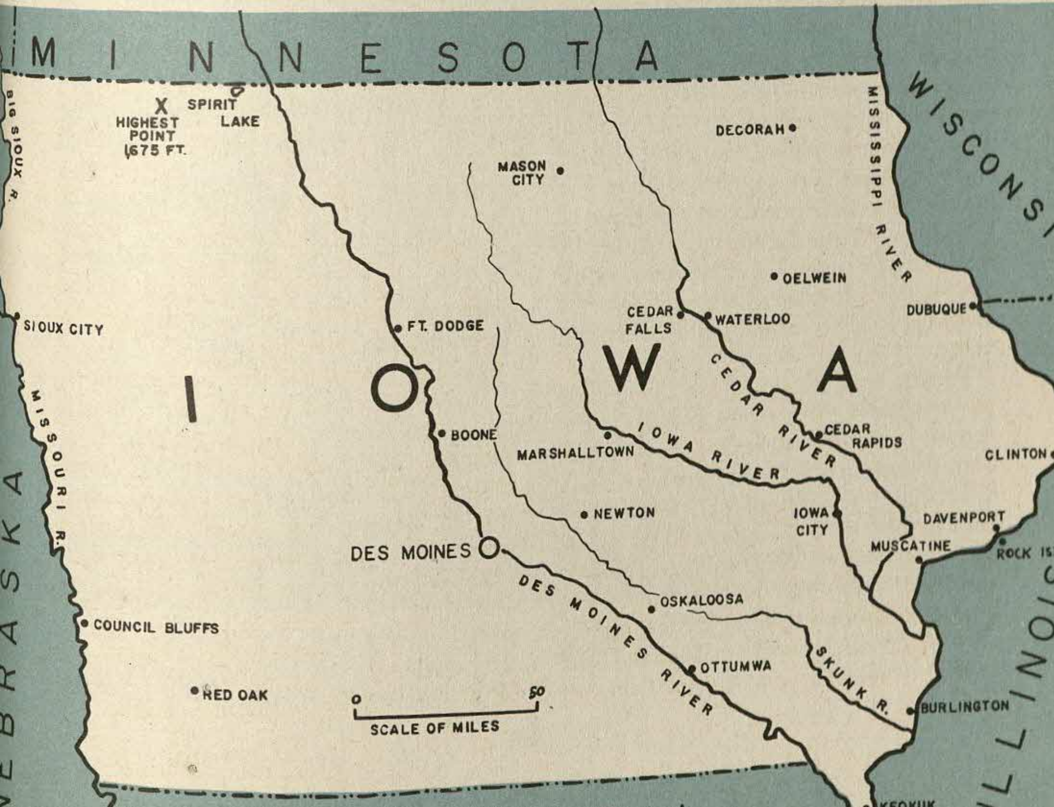
Climate. Iowa has long, humid summers and cold winters, during which there are great extremes of temperature. Winter temperatures average about 20°F., while those in summer average 70°. However, thermometers have been known to register as high as 113° and as low as 40° below zero. Iowa has about thirty-two inches of rain each year, and most of it falls in the spring and summer, thus insuring Iowa farmers against drought.

Farming. Iowa has the largest proportion of arable land of any state in the Union, and more than ninety per cent of its total area is devoted to farming. Iowa is usually the first corn-producing state, with an average crop of over 530,000,000 bushels, but Illinois sometimes ranks first. Strangely enough, most of Iowa's corn is not shipped to market, but instead is fed to hogs, of which more than 12,000,000 are raised each year. The state is also a leading producer of oats. Bounteous crops of wheat, barley, rye, soybeans, potatoes, popcorn, buckwheat, flax, sugar beets, hemp, red clover, alfalfa, and timothy are harvested. Iowa also produces nuts, vegetables, and fruits. This wealthiest farming state of the United States leads the nation in the number of hogs, horses, chickens, and eggs produced. It also raises beef and dairy cattle, sheep, mules, and turkeys, and is a top honey producer.

Minerals. Coal, underlying much of the south and central sections of the state, is one of Iowa's most valuable minerals; most of the yield is used within the state. Extensive clay deposits form the basis of a large brick and tile industry and provide supplies for several potteries. One of the nation's most valuable deposits of gypsum, used in making stucco, is near Fort Dodge. Other important minerals produced include sand, gravel, limestone, and shale (used in making cement, a major Iowa product). The once-rich lead mines around Dubuque, which attracted many early settlers to Iowa, are now nearly exhausted.

Manufactures. The large livestock production of the "Hawkeye State" forms the basis for its greatest industry, meat packing, centered chiefly in Sioux City, Cedar Rapids, Des Moines, Ottumwa, Waterloo, and Dubuque. Iowa is one of the nation's leading producers of butter and also makes cheese, condensed milk, and ice cream. Its other food products include corn syrup, dextrose, corn meal, breakfast cereals, beet sugar, flour, and canned fruits and vegetables. Muscatine is noted for its pearl buttons, made from Mississippi River clamshells, and the state produces many washing machines. Its other industrial products include fountain pens, farm implements and tools, furniture, planing-mill products, cardboard, beauty supplies, railroad and auto equipment, vending machines, furnaces, alcohol, chemicals, and glasswares. Des Moines is an outstanding printing and publishing center and has so many large insurance companies that it is often called "the Hartford of the West."

Commerce and Transportation. The large agricultural production and thriving industries of the state give Iowa a flourish-



Iowa Development Commission

STORING HAY ON IOWA FARM

Iowa usually has an abundant, high-quality hay crop. Most farmers store it in barn lofts, but some years the crop is so heavy that outside stocks and piles of baled hay are a common sight.

ing commerce. Constantly moving across the state lines are large exports of grain, meat, livestock, dairy products, and poultry, along with numerous manufactured goods.

Iowa is well equipped to handle its large commerce, for in addition to its many internal streams and the Mississippi and Missouri, the state is literally ribbed with 10,000 miles of railways. There is not a town in the state more than fifteen miles from transportation facilities.

Many Iowa products are moved by bus and truck lines that use the excellent highway system. Since the completion of the Federal Barge Line on the Mississippi River, a large amount of freight is carried by water.

The People and Their Organizations. The rich, well-watered soil of Iowa acted as a magnet in attracting early pioneers searching for fertile farm lands on which to settle. Although the first inhabitants of the state came largely from New England, great numbers of immigrants later settled in the territory. Included in Iowa's foreign population are Germans, Dutch, and Norwegians.

Because the greatest number of people in Iowa live on farms and in small towns, there are few large cities. Des Moines, the capital, is the largest city, followed by Sioux City, Davenport, Cedar Rapids, Waterloo, Council Bluffs, and Dubuque.

At the head of Iowa's public school system is the superintendent of public instruction, who is assisted by county superintendents. Included in the educational system is the University of Iowa, at Iowa City; the State College of Agriculture, at Ames; and the Iowa State Teachers College at Cedar Falls. Education is free, and school attendance is compulsory up to sixteen years of age. Iowa is noted as having one of the lowest illiteracy rates in the United States. The state has a number of small colleges founded by various religious denominations, including Grinnell College, Cornell College, Iowa Wesleyan, Parsons College, Drake University, Coe College, and Morningside College.

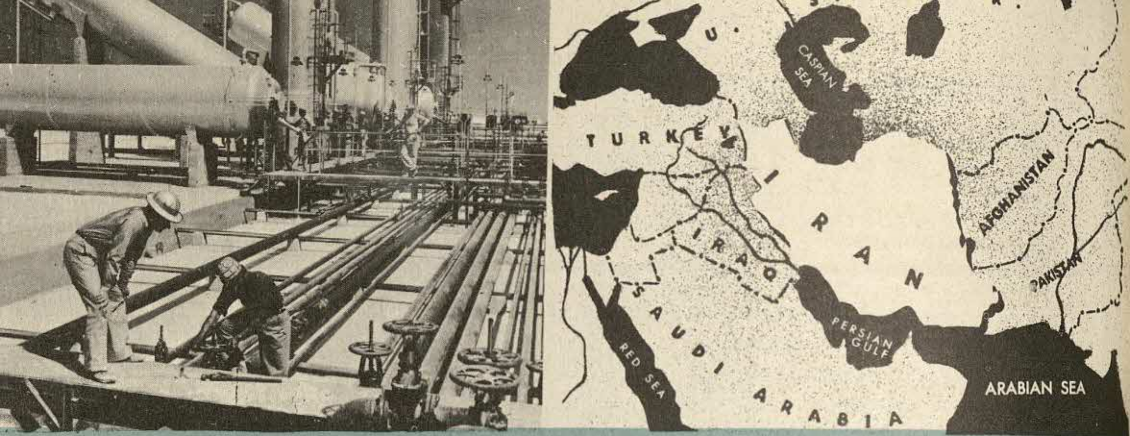
The governor of Iowa is elected for a two-year term, as are the other state officials. The state superintendent of schools is elected for four years. Members of the state senate serve four-year terms, but members of the house of representatives are elected every two years. The judicial branch of the government is headed by a supreme court.

History. When Marquette and Joliet explored the upper Mississippi River Valley in 1673, they crossed the eastern part of the Iowa territory. The grassy prairies had little to offer them, however, for they were interested chiefly in establishing fur-trading posts. So Iowa was left to the Indians for the next hundred years. Later explorers discovered rich deposits of lead in the northeastern part of the state, which brought about the establishment of the first permanent settlement, in 1788.

In that year Julien Dubuque opened the first lead mine, and the settlement was later named in his honor. Iowa was a part of the large territory in the Mississippi Valley which was held by France and later acquired by the United States in the Louisiana Purchase. The Federal government then opened the territory to settlers. In 1838 Iowa was organized as a territory and promised eventual statehood. In December, 1846, it was admitted to the Union as the twenty-fifth state. Since that time Iowa has had a rapid development. In 1857 Iowa adopted its second constitution, discarding the first one, which dated from the time Iowa became a state. See DES MOINES; MARQUETTE, JACQUES.

"OUT WHERE THE TALL CORN GROWS!"

World-famous for its huge annual crop of incredibly tall corn (16 ft.). Iowa has a state song based on this agrarian theme. This farm boy is justifiably proud.



Arabian American Oil Co.

OIL PUMPS NEW LIFE INTO AN ANCIENT LAND

Rich petroleum deposits give Iran strategic importance in world affairs. At left is one of the oil refineries developed by Western capital on the coast of Iran.

IRAN, *ee rahn′*. Now known officially as Iran, the ancient land of Persia was once the nucleus of a great empire. Here there lived some of the most powerful rulers in the world, controlling an empire that reached from the Mediterranean and Aegean seas to India. Later the country became so poor, weak, and backward that other nations controlled and exploited it. Today, however, Iran's strategic position in the Middle East, its fabulously rich oil fields, and its struggle for independence make it important again. Although still far from modern, it is rousing from its long sleep.

Covering about 628,000 square miles, and the home of some 20,000,000 people, Iran is located on a plateau in Southwest Asia. To the south lie the Gulf of Oman and the Persian Gulf; to the north the Caspian Sea and Soviet Russia. On the west are Turkey and Iraq; on the east Afghanistan and Pakistan.

The Land of Iran. The country is shaped like a huge plate, with its edges higher than the interior. However, it is not a level plateau, as ranges of rocky mountains cross the country, extending from southeast to northwest. In the north along the Caspian Sea is the great range of the Elburz Mountains, which at one point reach some 18,600 feet. Much of Iran is desert, but it also has its fertile oases, mountain valleys, and lowlands fringing the Persian Gulf and the Caspian Sea. Because the Iranian plateau is generally lower in the middle than on the edges, many of the rivers, most of which are unimportant, flow inland to great salt marshes and lakes. Only the Karun River is of any value in navigation.

Climate. The climate of Iran differs greatly in various regions of the country. In the lowest parts along the Persian Gulf and the Caspian Sea it is hot, damp, and humid. These lands are unhealthful and abound with fevers. In the higher plateau land, the temperatures vary widely, but the air is clear and dry. Except in the northern part, the rainfall is very sparse.

Minerals. Iran's southwestern oil fields, among the earth's richest, were developed by the Anglo-Iranian Oil Company. Like the company's refinery at Abadan, one of the world's largest, they were British-controlled until Iran nationalized its oil industry in 1951. Iran has produced fine turquoise for centuries and has deposits of coal, iron, copper, lead, and manganese.

The Products of Farm and Forest. Although most of the productive land remains uncultivated, agriculture is the most important industry. Only the most primitive methods and tools are used, but even so the crops are large. The staple products of the country are wheat, barley, and cotton. The cultivation of rice is also important. Fruits are grown in great variety and dried fruits are exported, along with tobacco, tea, and nuts. Sugar beets, corn, and alfalfa are also raised. Most of the country's farming lands must be irrigated.

Livestock includes horses, mules, goats, cattle, and sheep. The most famous product is Persian lambskin, used all over the world in the making of fur coats. Camels are important as the chief means of travel over the deserts.

Extensive forests cover the slopes of the Elburz Mountains and the lowlands along the Caspian Sea. There are important fisheries in the Caspian Sea, and pearl fishing in the Persian Gulf is another leading industry.

Manufactures and Commerce. Manufacturing in Iran has, for the most part, never advanced beyond hand labor in the homes of the people. The products, however, are of high quality and distinctive design. The leading products of Iran are the famous Oriental rugs, which are shipped all over the world. In recent years the government has taken the lead in introducing modern weaving and spinning machinery, so that now there is a small but thriving textile (cotton, wool, and silk) industry. Other products include wines, canned foods, beet sugar, glass, cigarettes, and leather goods. The chief exports include oil, cotton, rugs, fruits, gums, hides, wool, and rice. The government's efforts to industrialize and modernize the country and to raise living standards were interrupted by World War II, but were resumed soon after the end of the conflict.

Even today many Iranians still travel by camel, following ancient caravan routes. But motor transport has increased in modern times, and many new paved roads have been built. The Trans-Iranian Railroad, built in the 1930's across the Elburz Mountains, from the Caspian to the Persian Gulf, was one of the world's great engineering feats. During World War II, the Allies used it and Iranian roads in shipping supplies into Russia. Iran has also built various other railroads in recent times and has airports in its larger cities, especially at Tehran, the capital. Other important cities include Tabriz, Isfahan, Meshed, and Hamadan.

The People and Their Institutions. Iran was settled in ancient times by Indo-Europeans, who migrated to the region from Central Asia. These people called themselves Aryans, hence the name Iran. However, Iran has since been invaded many times, and now the Iranians are a mixture of several different nationalities. Although a large part of the population lives in cities and towns, many people live in tribal villages and cultivate their lands, which they hold in common. There are also wild, nomadic tribes who live in the mountains, subsisting upon the products of their sheep and goats.

The Mohammedan religion, which most

IRAN'S ANTIQUE ART IS NEARLY AS OLD AS THE RACE

Modern Iran was once the nucleus of the great Persian Empire which flourished centuries before Christ; it held sway over extensive areas in the Near East.

of the people follow, has been one of the factors retarding the development of Iran. Illiteracy is widespread. Only recently has the educational system of the country been very effective. Many schools have now been established for children, where they may learn of the modern world.

At the head of the government of Iran is a monarch known as the shah. He is assisted in his work by a Cabinet of ministers. The twenty-six provinces are headed by governors-general and governors, who are directly responsible to the central government.

History. For about 400 years, beginning in the ninth century B. C., the inhabitants of Iran were held in bondage by foreigners, first by the Assyrians and then by the Medes. It was under Cyrus the Great that Iran changed from a vassal state to the most powerful country in the ancient world. Cyrus began by conquering Media, the country that had held control of Iran, and later he set out to conquer the world. So successful was he that he extended his empire from India to the Aegean Sea.

The next great ruler of Iran was Darius, who organized the empire into provinces, each with its own governor, or satrap, controlled by the king. After settling Iran's internal affairs, he turned his attention to a conquest of Greece. However, his army was defeated in the Battle of Marathon in 490 B. C. Ten years later his son Xerxes, who came to the throne when Darius died, was defeated by the Greeks in several, decisive battles.

Iran, under succeeding rulers, gradually weakened because of internal warfare, and finally yielded to Alexander the Great in 331 B. C. However, Greece held control of the country for only a short time, and several other nations ruled for short periods before the mighty Genghis Khan swept down from the plains of Mongolia and conquered the country early in the thirteenth century. For more than 150 years the Mongols ruled Iran and then were conquered by Tamerlane.

It was not until 1499 that an Iranian ruler named Ismail arose and overcame the foreigners. Shah Ismail is called the founder of modern Iran. The dynasty that ruled Iran until 1925 was founded by Aga Mohammed Khan in 1794. His successor, Fath Ali, was defeated in a war with Russia, and Iran lost a part of its territory. A few years later, in another war with Russia,

BRICK PRODUCTION WITH A SOLAR FURNACE

In the brick fields of Iran, laborers draw water to wet the brick-making loam. The bricks are baked in the scorching sun and then leveled by a workman.

Lotte Errel—Pix

SQUALOR AND BEAUTY

That is the eternal contrast of the Orient, and it is well represented in Iran. Above, in the courtyard of one of the native caravanseries, or inns, of Iran. Right, the mosque which guards the tomb of poet Omar Khayyam. The monument is in Nishapur.

Iran lost Armenia. Thereafter Russia exercised great influence on Iranian affairs, and Iran became weak and disorganized.

However, it rose once more to power and prosperity under the leadership of Nasir-ud-Din, who became shah in 1848. Not only did he solve the internal problems of the country but he also embarked upon a program of expansion, particularly in Afghanistan and Baluchistan. This program, however, was not a success, for Great Britain forced him to give up his attempts at conquest. He ruled Iran for forty-eight years. His successor, Muzaffar-ud-Din, succeeded in improving internal conditions, although he was a weak ruler.

In 1906 the people asked for a constitution and a voice in their government. Shortly before his death that same year, Muzaffar-ud-Din granted the people a National Assembly. Under Shah Mohammed Ali, his son, a Constitution was drawn up and approved. However, Mohammed Ali and the Assembly could not agree on many matters, and after three years he was driven from the throne. His seven-year old son, Ahmad, was then made ruler.

Because Iran stands as a barrier between Russia and the Persian Gulf, Russia has always attempted to dominate the country in an effort to gain a southern outlet to the sea. Great Britain opposed Russian domination because it was a threat to British control of India and also because the British wanted the control of Iran's rich oil deposits. As a result, Russia and Great Britain agreed in 1907 to divide the country into spheres of influence. This arrangement, however, upset the stability of the country, and in 1910 Morgan Shuster of the United States was given the task of straightening out Iran's jumbled financial affairs. Although he put the country on a firm basis, representative government failed there.

In 1921 army leader Riza Khan seized control and, in 1925, became Iran's hereditary ruler, called Riza Shah Pahlevi. Although he pushed modernization, he had to abdicate to his son, Mohammed, during World War II, when Allied troops occupied strategically important, oil-rich Iran. In 1945, Iran joined the United Nations. Trying to communize Iranian Azerbaijan, Russia refused to withdraw her troops until she gained oil concessions in 1946. When Iran nationalized its foreign-coveted oil industry, Britain protested vehemently, and grave international and internal crises arose as Iranian Nationalists struggled to enforce a strict "Iran-for-Iranians" policy.

See Arabia, map; also the following titles:

Alexander the Great
Cyrus (the Great)
Darius (I, III)
Greece
Omar Khayyam
Zoroaster

IRAQ, *ee rahk'*. Ancient Mesopotamia, or Iraq, is the traditional site of the Garden of Eden and one of the cradles of civilization. Today even its fertile Tigris-Euphrates Valley must be irrigated, and the rest of the country is largely mountainous or desert land. Yet Iraq's British-managed oil fields near Kirkuk, Mosul, and Basra are among the world's richest.

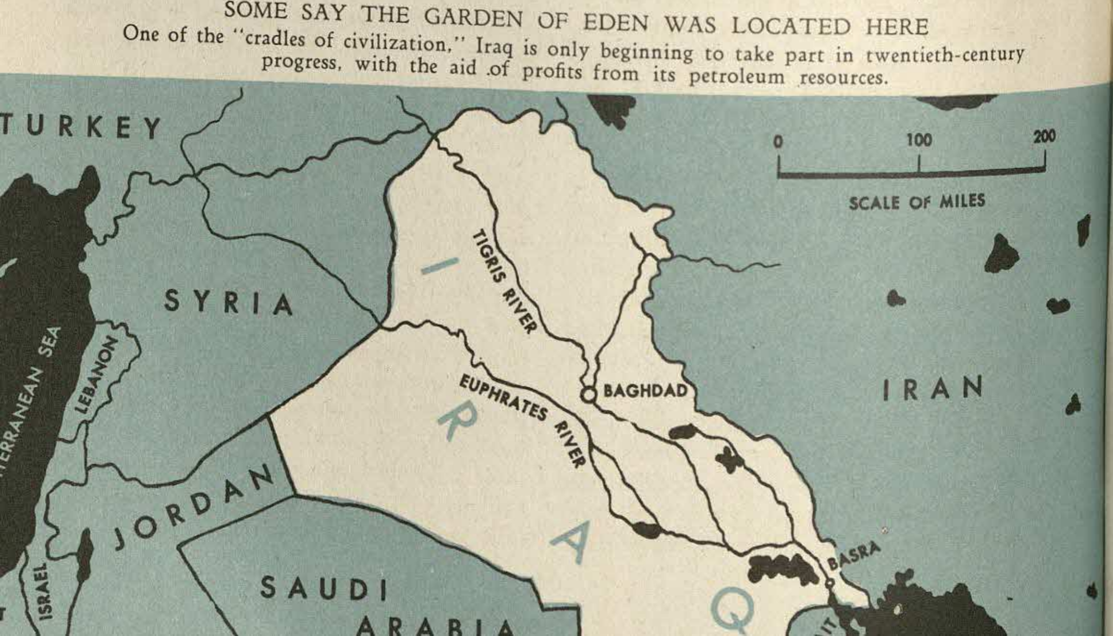
Covering 116,600 square miles, Iraq is bounded by Turkey on the north; Iran on the east; the Persian Gulf, Kuwait, and Saudi Arabia on the south; and Syria and Jordan on the west. Most of its more than 6,500,000 people are illiterate, Arabic-speaking Moslems. Iraq is spending much of its oil royalties on improving education and health and modernizing the country.

Iraq's few manufactures include brick, tiles, pottery, glass, textiles, cigarettes, Oriental rugs, and leather and copper wares. It produces some four-fifths of the world's dates. Other crops include barley, rice, and other grains, cotton, tobacco, and fruits. Its nomadic and seminomadic tribes herd many cattle, sheep, goats, and camels. Rail, air, and motor transport is increasing, and steamboats ply the Tigris and Euphrates. Yet much of Iraq's goods is still carried by camels or by circular reed boats.

Freed from Turkey after World War I, Iraq was a British mandate until 1932, when it became independent. In 1945 it helped to found the Arab League and joined the United Nations. Iraq is a constitutional monarchy, ruled by a hereditary king and a two-house parliament. Its capital is Baghdad.

Also consult the following titles:

Arabia (map)
Assyria
Babylon
Babylonia
Baghdad
Eden
Euphrates
Nineveh
Tigris



SOME SAY THE GARDEN OF EDEN WAS LOCATED HERE
One of the "cradles of civilization," Iraq is only beginning to take part in twentieth-century progress, with the aid of profits from its petroleum resources.

Irish Tourist Association, Inc.

IRE'LAND. Lying to the west of England, across the Irish Sea, is an island beloved by Irish people the world over. It is the "Emerald Isle" and the "Erin" of song and poetry, the land of the shamrock, Saint Patrick, the River Shannon, and the Lakes of Killarney; it is Ireland, a country of two governments. After a long struggle for Home Rule, the people of Southern Ireland set up the Irish Free State; not content with semi-independence, they voted for a free republic in 1937, cutting off nearly all of their ties with Great Britain, and gave their land its old Gaelic name, Eire. Then in 1947 the larger state, covering some four fifths of the island, severed its remaining ties with Britain and on April 18, 1949, was proclaimed the Republic of Ireland.

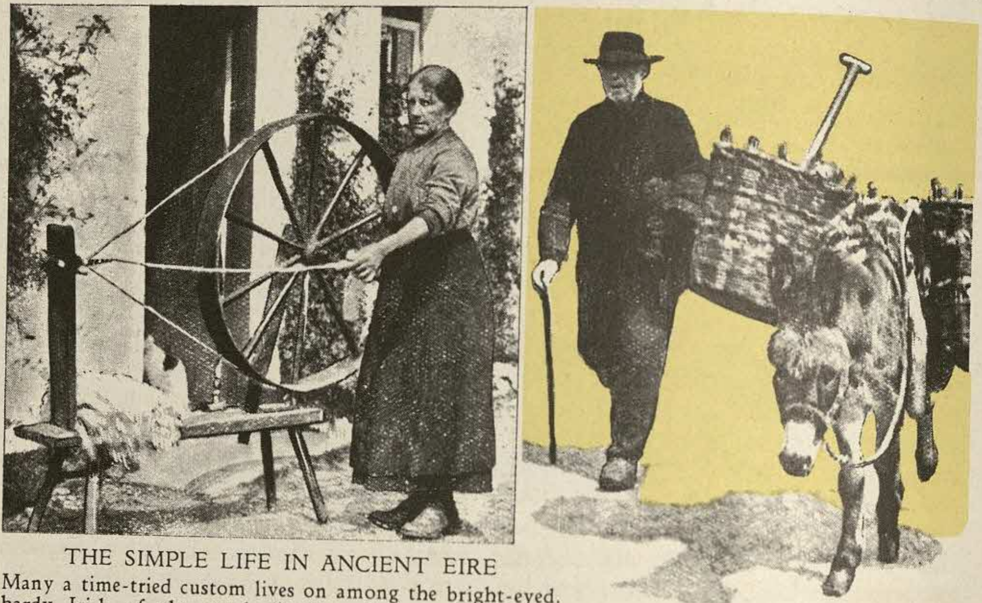
The northern section that is usually called Ulster has remained a part of the United Kingdom of Great Britain and Northern Ireland. It is the hope of the rest of the island that at some future day Ireland will be one nation, politically and geographically.

The Land. The interior of Ireland is a flat, level plain dotted with many large swamps and marshes, much lower than the mountainous regions that lie along the coast. Because of the irregular surface of the island, many of the rivers wind a tortuous course on their way to the sea, and are practically unnavigable, although the largest river in the country, the Shannon, is navigable for its entire length. Ireland is famous for its beautiful lakes, particularly those of Killarney.

Climate. Exposed to the warm westerly winds from the Atlantic, Ireland enjoys a temperate climate all the year. The summers are cool and the winters mild. The average temperature for the year is about 50°F. Fog, mist, and rain occur frequently, giving the island an average precipitation of about forty inches a year.

Natural Resources. Ireland is not well supplied with mineral wealth, and many of the deposits are of poor quality. There are some deposits of coal in the southwest which have not been seriously exploited. There are also scattered supplies of lead, iron ore, marble, clay, salt, and sand. A considerable quantity of limestone is quarried and used as building stone and in making lime. In the interior marshes there are vast supplies of peat, which is used here more extensively than any other fuel.

Products of the Land and Sea. The island has very fertile soil, which, in combination with the moist climate, favors the production of large crops, and more people are engaged in farming than in any other occupation. For many years Ireland has



THE SIMPLE LIFE IN ANCIENT EIRE

Many a time-tried custom lives on among the bright-eyed, hardy Irish of the rural districts. Left, a Connemara woman spinning. Right, a turf cutter on his way home with a donkey load of peat.

been noted for its large potato crop, and the farmers have so specialized in the raising of potatoes that the name *Irish* has been given to this all-important vegetable, which is the staple food of the country. Grain production is important in all provinces, with oats the leading crop. Other important agricultural products include hay, barley, turnips, mangels, and other vegetables. Livestock raising is a leading occupation. Large numbers of cattle are raised, along with sheep, horses, and hogs. Dairying, on a co-operative basis, is an important farm industry.

Agriculture in Ireland has had a turbulent history. When England controlled the country, the Irish farmers suffered many injustices from their English landlords. The English had taken the most fertile sections and charged high rents for the use of the land. However, in recent years many changes have been made, and tenants have been allowed to buy the land they farmed.

Off the shores of Ireland are many valuable fishing grounds, and fishing constitutes one of its most important industries.

Manufacturing. Manufacturing is not so well developed in Ireland as in England, because of a lack of raw materials and coal. Linen, famous the world over, is the most important product of Irish factories. Large linen manufactures are found chiefly in Belfast, in Northern Ireland. Textile manufacturing, particularly of wool, is also important. Northern Ireland is also noted for its large shipbuilding industry. Other important manufactures include brewing, meat packing, and the preparation of tobacco and dairy products. Manufacturing is being encouraged by the government of Southern Ireland, in the hope of making the country self-sufficient.

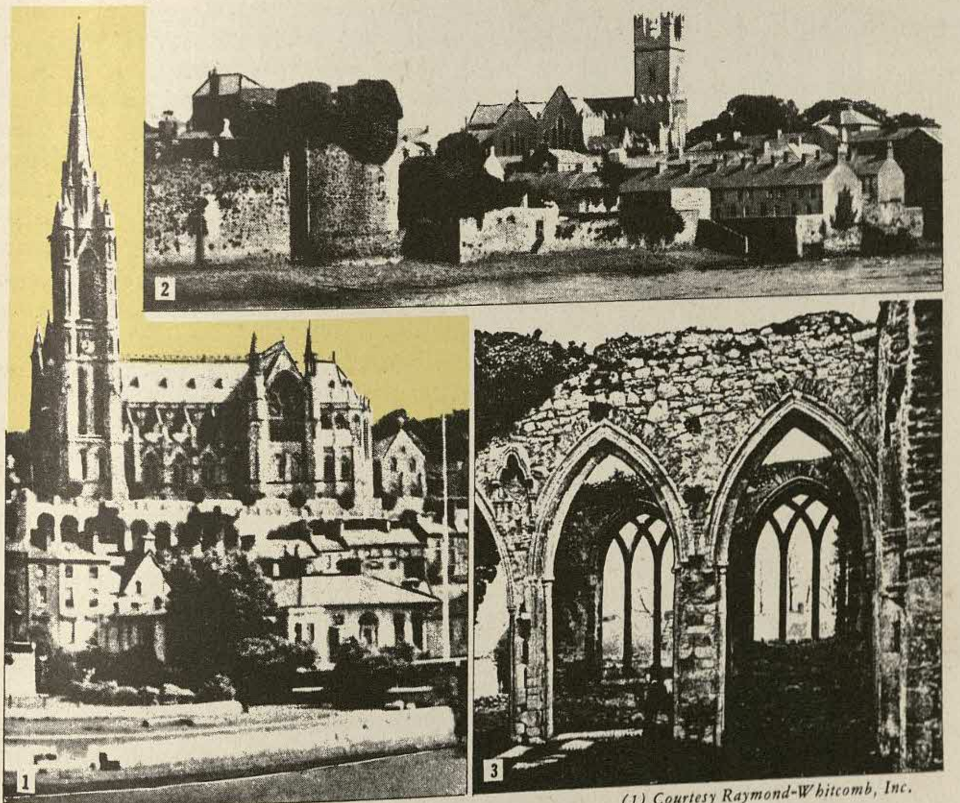
Trade and Transportation. Although Ireland has considerable trade with countries all over the world, most of its exports go to England. Its leading export is cattle, followed by linen, liquor, meat, and dairy products. It imports wheat and other grains, coal, iron and steel products, machinery, textile goods, and wood products.

There are more than 600 miles of inland waterways within the country, including the River Shannon (which is navigable for the largest ocean ships in part of its course), and many canals connecting the larger rivers. In addition, there are about 4,000 miles of railways, as well as extensive bus lines and electric railways.

The People and Their Language. Earliest records reveal that Ireland was inhabited long before the first written history. The Roman invaders of Britain stopped short of Ireland, which they found to be occupied by tribes of Celtic people. Intensely loyal to their country, the people today are called Irish. At one time the population numbered more than 8,000,000, but throughout the eighteenth and nineteenth centuries famine and emigration—the famous "Flight of the Wild Geese"—reduced that number greatly; the population is now about 2,853,000.

The Irish language is called Gaelic and is a member of the Celtic group of tongues. Although English is more widely used, the Gaelic has been revived and is now the official language of the island outside of Ulster. In earlier times it was the language of a voluminous Irish literature which included history, prose, and poetry. In recent years, along with the Home Rule movement, there has been a renewed interest in Irish literature. Leaders of this movement were Lady Gregory, J. M. Synge, William Butler Yeats, and Douglas Hyde.

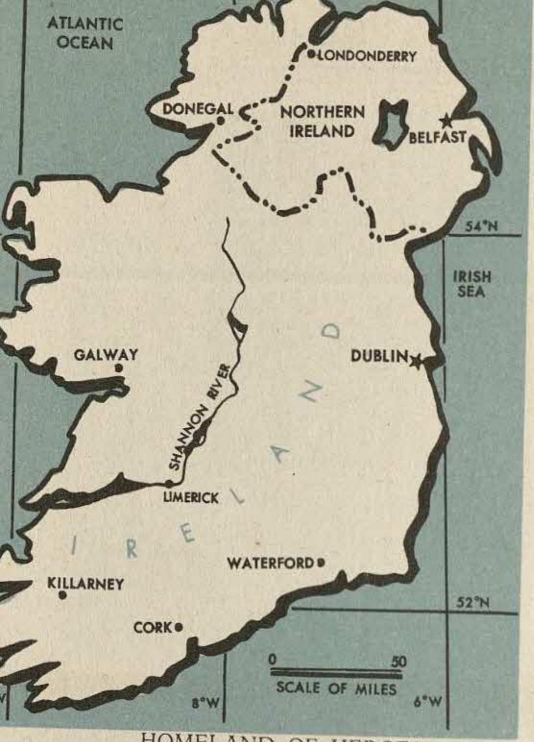
Divisions of Government. Belfast and Dublin are the respective capitals of Northern Ireland and the former Irish Free State. On December 29, 1937, the twenty-six southern counties and four county boroughs dropped the name Irish Free State and became known as Eire in Gaelic and Ireland in English. A new Constitution went into effect at that time. Six northern



(1) Courtesy Raymond-Whitcomb, Inc.

"SURE, THEY SPRINKLED IT WITH STARDUST"—SHAMROCK LAND

Here is the charm of lovely Ireland. (1) Saint Colman's Cathedral, Cobh. (2) Saint Mary's Cathedral and castle, Limerick. (3) Ruined abbey of Castle Dermott, Kildare.



HOMELAND OF HEROES
Emigrants from this small island have become political and military leaders in many lands.

counties (all but three of the counties of Ulster) and two county boroughs, however, remain as Northern Ireland, apart from the Dublin government. The Irish Republic is now a completely independent nation. Although it has an elected President, its real chief executive is the Prime Minister. The upper house of its Parliament, or *Seanad Eireann,* has little power, but the popularly elected lower chamber, called the *Dail Eireann,* actually rules the nation.

Northern Ireland is a part of the United Kingdom. It has its own Parliament, made up of a Senate and a House of Commons, and returns thirteen members to the House of Commons in London.

Schools and Churches. The educational system of both Northern Ireland and Ireland is very progressive, and elementary education is free. In Ireland, which is predominantly Catholic, the secondary schools are private institutions and are conducted in many cases by religious orders. In Northern Ireland religious doctrines are not taught in the schools. Higher institutions of learning include Queen's University of Belfast, the University of Dublin (Trinity College), and the National University of Ireland, composed of the four colleges of Dublin, Cork, Galway, and Maynooth.

In Northern Ireland the Protestant churches are by far the strongest, but in Ireland most of the population is Roman Catholic. There is, however, complete freedom of worship throughout the island.

Early History. Ireland was first inhabited by a succession of fierce tribes, about whom little is known, though the later ones were a Celtic race. Caesar, when he conquered England, found these primitive people on the island to the west, but Ireland never came under Roman conquest. The first clear picture comes when one of these Gaelic tribes, called the Scotti, crossed the Irish Sea and began a conquest against the Romans in England, and later in Gaul.

Before Saint Patrick began his missionary work in Ireland in the fifth century and, according to legend, also drove out all the snakes, the people, for the most part, had a pagan religion, the Druid worship. Saint Patrick converted many of the people to Christianity, and his work was continued by other priests during the next century.

Ireland was at peace for the following 200 years, and sent missionaries throughout Europe. But peace ended when the country was invaded by the Norsemen who, by the ninth century, had conquered a large part of the coast line and had set up a kingdom. However, the Irish revolted in 1014 under the leadership of Brian Boroimhe (Boru), and defeated the Norse. Under Brian the island was united, but upon his death it was again divided into many small provinces.

The English Conquests. In 1166 the king of the province of Leinster, Dermot MacMurrough, was forced to flee. He went to Henry II of England, asking for the right to raise an army of Englishmen in order to regain his kingdom. Returning to Ireland with a strong army, he succeeded in recovering his territories. MacMurrough was succeeded by his English son-in-law, Richard Clare, called "Strongbow." This succession marked the first time that the English obtained a foothold in Ireland. Although they made frequent expeditions to Ireland, they were unable to gain much influence in the country.

The situation changed, however, when Henry VII decreed that he was to have control over the Irish Parliament. His son, Henry VIII, acting as head of the Anglican Church, began to persecute the Catholics in Ireland in an attempt to make them recognize him as head of the Church. He destroyed many of the monasteries and confiscated their wealth. Henry's son, Edward VI, also attacked the Catholics and was met with bitter opposition. Mary I, however, restored the Catholic Church to its former position of importance in Ireland.

Catholics were again persecuted during the reign of Queen Elizabeth and their lands taken from them. In retaliation the Irish rose in rebellion, and there followed a series of cruel wars. Under James I and Cromwell, the policy of persecution continued. It was not until James II came to the throne that this policy was reversed. He restored all the lands that had been confiscated in 1641, and gave to the Catholics important positions in the government. A revolution drove James from the throne; and when he enlisted the aid of the Irish in his efforts to regain the crown, Ireland again became involved in a war with England. James's forces were defeated in 1690 at the Battle of the Boyne, and once again

CITY AND COUNTRYSIDE

Below is Donegal Square in Belfast, the capital of Northern Ireland. The cottage with thatched roof at right is in southeastern Ireland.

Irish Tourist Association, Inc., London Midland & Scottish Railroad Co.

Irish Tourist Association

THE BROADWAY OF IRELAND
O'Connell Street in Dublin presents a busy traffic picture during the daily rush hour.

Irish lands were confiscated and the Catholic religion outlawed.

For the next hundred years the anti-Catholic laws were enforced, a fact which led to frequent rebellions. Although some of their rights were returned to them in 1778, the Catholics continued their fight for freedom and independence. A major rebellion in 1798 led to the union of the English and Irish Parliaments in 1800.

This union was the cause of much of the trouble in Ireland up to recent years. The Irish resented the loss of their right to govern themselves and constantly fought for the return of the Irish Parliament. In addition, the land laws that England passed from time to time caused great suffering among the Irish people. In 1845 the potato crop in Ireland failed and thousands of people died of starvation, while many more left the country and migrated to America. As a result, the land laws were changed, and Ireland slowly returned to prosperity.

Home Rule. However, the Irish continued their struggle for self-government. The Home Rule Association was formed in 1870 for this purpose; and although it made great contributions to the cause of freedom, particularly when led by Charles Parnell, it ultimately failed in its purpose. Prime Minister Gladstone of England sympathized with the Irish cause and attempted to put through a Home Rule bill in 1893, but the bill was defeated.

The movement lost ground with the return of prosperity in Ireland; but later, under the leadership of John Dillon and John Redmond, it gained new life. In 1912 and in 1913, bills for Home Rule were presented in Parliament, but each time they were defeated. In 1914, however, the Home Rule bill was passed, much to Ireland's joy. However, before it could be put into operation the First World War began, and Parliament decided to wait until peace was restored before making the law effective.

In spite of Ireland's dissatisfaction with the turn of events, the country as a whole supported England in the war. A small rebellious group known as the Sinn Fein Society staged an insurrection in Dublin in 1916, which was quickly put down. At the close of the war, the Sinn Fein Society held a meeting at Dublin, in which Ireland's independence was declared. There followed a fiercely fought civil war, which ended when Lloyd George called a peace conference in London. It resulted in self-government for Southern Ireland, but Northern Ireland voted to remain in the United Kingdom. The Irish Free State was established under a temporary government.

But not all Ireland wanted the Free State. Men like Eamon De Valera wanted complete independence, not another British dominion. In 1932 De Valera became president of the country's executive council and the people adopted a new constitution which gave Ireland the Gaelic name of Eire and made the country almost independent. Ireland remained neutral during World War II and in 1949 separated herself from the British Commonwealth to become a sovereign republic. During De Valera's last years in office he had to contend with unemployment and the unsolved question of union between North and South Ireland. In 1954 he was succeeded as Prime Minister by J. A. Costello. See Belfast; De Valera, Eamon; Dublin.

IRID'IUM. One of the heaviest and rarest of metals, iridium is a silvery element which resembles platinum. It is usually found with platinum or osmium. It has a very high melting point, about 2,300°C. Only a few thousand troy ounces are refined annually. One of its uses is to make the tips of fountain pens more durable. In various alloys, iridium is used in standard weights, and in scientific and electrical apparatus. Its symbol is *Ir*.

BEAUTY FROM THE BULB—THE IRIS

I'RIS. The range of delicate colors seen in the irises makes them vie with the rainbow in beauty. Their name, in fact, is from the Latin and Greek words meaning *rainbow*. According to Plutarch, the ancient Egyptian word *iris* meant *eye of Heaven*. Louis VII, king of France in 1137-80, chose an iris as his coat of arms during the Second Crusade. Called *fleur-de-lis* by the French, it became the national emblem of their country. The irises form a genus in the iris family.

There are many kinds of irises—tall ones, dwarf ones, and all the intermediate grades between. There are bulbous sorts and those with fleshy underground stems. There are those with beards on the lower segments of the flowers, and those without beards. German, Florentine, Siberian, Japanese, Spanish, English, European wild flags, pumilas, and scores of others are interesting to grow. Irises should be transplanted in August or September, for the roots to be grown the next season start growing at that time.

IRIS. See Eye.

IRISH FREE STATE. See Ireland.

IRISH SEA. With an average width of about sixty miles, the Irish Sea separates Ireland and Great Britain. It has a length of about 130 miles and is connected with the Atlantic Ocean by the North Channel on the north and Saint George's Channel on the south.

AN ERA IS NAMED FOR THIS
Iron ore, foundation of Iron Age civilization.

IRON. Second only to coal among substances taken from the earth, iron is a metal that has contributed more to progress than any other known to man. The present Machine Age is based on iron. Automobiles, locomotives, railroad cars, tracks,

Tennessee Coal & Iron Division, U. S. Steel Corp.

FROM AN UNDERGROUND CAVE TO A FIERY FURNACE

At left, the arms of a mechanical loader scoop up ore from the floor of an iron mine. The loader pulls the ore onto a conveyor. At right, molten iron is poured into the white-hot interior of an open-hearth furnace, where it will be converted into steel.

signal towers, bicycles, steamships, bridges, skyscrapers, radio sets, kitchen hardware and equipment, electrical appliances, furnaces, pipes, stoves, refrigerators, tools, scientific and medical instruments, ice skates, printing presses, plows, binders, thrashing machines, dynamos, battleships, cannon, rifles, bullets, shells, bayonets, swords, knives, telegraph instruments, telephones, machinery of all kinds, nails, screws, hammers, saws, chisels, augurs, swings and bars on the playground—all of these and more are made from iron or its most important alloy, steel.

So important to man is this element that it has immeasurably influenced the affairs of the world. Wars have been fought for the possession of iron deposits and products. Iron implements and ornaments once were treasured by royalty as precious possessions. The power of armies is still measured by the abundance of iron and steel resources at their command, and wars through history have been won and lost because of the supply of iron for swords, shields, armor, and armaments.

Millions of people depend upon iron for their livelihood. In the United States alone, huge iron-and-steel companies employ hordes of workers and have billions of dollars invested in mines, at home and abroad, in ore-carrying ships and railways, in mills, and in other branches of the country's great iron industry.

What It Is. Iron is one of the most common elements, being found everywhere in waters, plants, and animals. It is an important part of man's body, particularly of the

U. S. Steel Photo

IRON COMES FROM THE FOUR CORNERS OF THE EARTH

The map shows major ore deposits. In the photograph, an ore boat unloads its cargo.

blood. In its pure state it is found only in the laboratory and a small area in Greenland. The iron ore from which iron and steel products are made usually contains oxygen, sulphur, carbon, lime, arsenic, phosphorus, nickel, copper, aluminum, manganese, and many other metals and elements. This ore, in one form or another, is found on every continent and in almost every country.

Iron ore is found in many parts of the United States, but most of that mined comes from the Lake Superior district of Minnesota, Michigan, and Wisconsin, especially from the Mesabi, Cuyuna, and Vermilion ranges. The next most important producing region is around Birmingham, Ala.

Soviet Russia is one of the leading producers of iron ore. Brazil, Chile, Africa, and Cuba also have rich deposits, and a mountain of ore in Venezuela may prove to be the world's greatest. High-grade ore is mined in Ontario, Can., and underwater off the shore of Newfoundland. Another rich field, on the Labrador-Quebec boundary, is being developed. Although many other countries have large deposits, only a few make most of the world's pig iron. These include the United States, which produces over half of the total output, Soviet Russia, Great Britain, France, Germany, Belgium, and Sweden. In most of these, including the United States, at least some of the ore used is imported.

When shipped to the steel mills, the ore is colored a rusty red. This is due to the peculiar effect of oxygen on iron, causing it to rust. Girders for a bridge or skyscraper are always covered with a protective coat of paint to prevent this rusting, or *oxidation.* There are several types of ore, including *magnetite,* which is blackish and highly attracted to magnets; *hematite,* the chief type found in the United States; *limonite,* often called *brown ore* because of the color; and *siderite,* which contains only forty per cent iron, the least of the four types.

Ore from the open pits of the Lake Superior region is shipped almost entirely in boats especially constructed for the purpose. Trains carry the ore from near-by ports to Pittsburgh and other steel centers of the region. The loading and unloading equipment at the great iron-ore ports of the Great Lakes are marvelous devices of machinery, capable of loading or unloading the cargo of an ore boat in a very short time. This ore traffic constitutes the most important part of Great Lakes shipping.

The Nature of Iron. The reasons why iron is so useful to the world are many. It is the strongest metal, it is the only one that can be hardened and tempered, and its magnetic quality is the base of our whole electrical industry. It is readily welded and cast, and can be given almost any quality we desire. It can be hard or soft, brittle as glass, or almost as ductile as copper; it can be springy or springless, strong or weak, magnetic or almost non-magnetic. It forms compounds readily—a quality that makes it corrode easily because it unites with oxygen from the air.

In the manufacture of iron and steel, alloys with various metals are made to give it special properties. Manganese may be added to give it toughness, rigidity, and strength; nickel, for armor plate; chromium and tungsten, for hard tools; and vanadium to permit it to endure severe shocks. Research men, called *metallurgists,* are constantly experimenting with iron and other alloys to find other uses.

Products of Iron. When iron ore is taken to a steel mill, it is reduced and melted in huge blast furnaces, from which the molten metal is cast into molds for pig iron or cast iron. Pig iron consists of bars ("pigs") of iron which may be remelted and purified to form soft, tough, flexible wrought iron, which is used when iron must be twisted into many shapes. Cast iron is not malleable. It is hard and brittle, more easily fused than steel; but, unlike steel, it cannot be hammer-welded, forged or rolled. Steel, from which so many articles in the world are made, has less carbon content than pig iron, but more carbon than wrought iron.

Centuries of Iron. The history of iron begins with the Iron Age. The Egyptians were familiar with it and named it *ba-en-pet,* the metal from heaven. In Assyria and Babylonia, they called it *an-bar* or *pargellu,* meaning *metal.* Some authorities think that the process of smelting iron from ore was first used by the Hindus. Iron was called *ferrum* by the Romans, who made great use of the metal. It is from this word that we derive the term *ferrous* to describe iron and steel.

William the Conqueror was able to win the Battle of Hastings because of superior iron and steel weapons and armor; and, appreciating this fact, he gave his ironworker a position of great importance in his new kingdom. During the Crusades, the Arabians and Turks were famed for their matchless steel. The Spaniards were skillful metal workers, and their Toledo and Damascus swords still are unsurpassed.

The actual manufacture of iron products and steel is described in the article STEEL.

Consult the following titles for additional information:

Ductility
Hematite
Iron Age
Malleability
Steel
Tempering

IRON AGE. Primitive man knew nothing of iron. He may have noticed the peculiar meteors that fell from the sky and wondered about the ruddy earth we know as iron ore, but he made no use of the metal. His tools, weapons, or ornaments were first made of stone, then bronze. Finally, he found out the uses of iron and entered the Iron Age.

There are no definite time limits for the Iron Age. It began with various people at different times; and even today some primitive peoples have not yet entered this stage of civilization. Greece entered the Iron Age about the time the *Iliad* and the *Odyssey* were written. The use of iron spread northward, and the people of Scandinavia entered it about the time of the Christian Era. The first iron for tools and implements was hammered into shape, not cast. The Iron Age might still be said to exist, for steel is an alloy of iron. See STONE AGE; BRONZE AGE; ARCHAEOLOGY.

IRON CROWN. See CROWN.

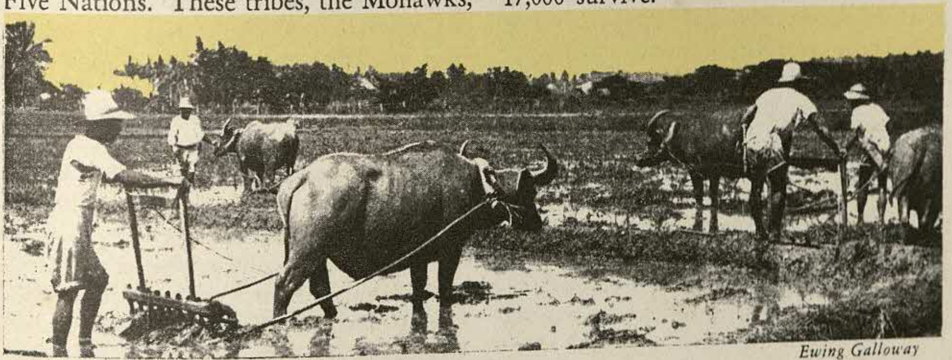
IRONSIDES, OLD. See CONSTITUTION, THE.

IRONWOOD. Any tree with exceptionally heavy, hard wood is commonly called ironwood. Examples are African ebony and lignum vitae. An American ironwood is the hop hornbeam, a small tree whose wood will sink in water. Various trees of this type are also found in Asia. See HORNBEAM.

IROQUOIAN, *ir o ḳwoi'an,* **INDIANS.** Strongest of all the Indian groups living east of the Mississippi River were the five tribes composing the Iroquoian league, or Five Nations. These tribes, the Mohawks, Oneidas, Onondagas, Cayugas, and Senecas, held the land from Lake Huron to the Atlantic coast, south through New York and Pennsylvania.

The Iroquoian tribes lived in strong, well-built wood houses and were governed by a code of laws. Agriculture was their chief occupation, and vegetables, corn, and tobacco their principal crops. Because of their strength in numbers and fighting ability, the Iroquois were invaluable aids to the English in the French and Indian War and were responsible in many instances for keeping the French and their Algonquian allies from invading the colonies.

A sixth tribe, the Huron, was related to the Iroquois, but the Hurons never joined the confederacy. Instead, they made unceasing war on the league. It was Champlain's aid to the Hurons that resulted in the Iroquoian hatred of the French, an enmity that never died. During the Revolutionary War, some sided with the English and others with the Americans. Today the Iroquoians live on reservations in New York state and Ontario. Approximately 17,000 survive.

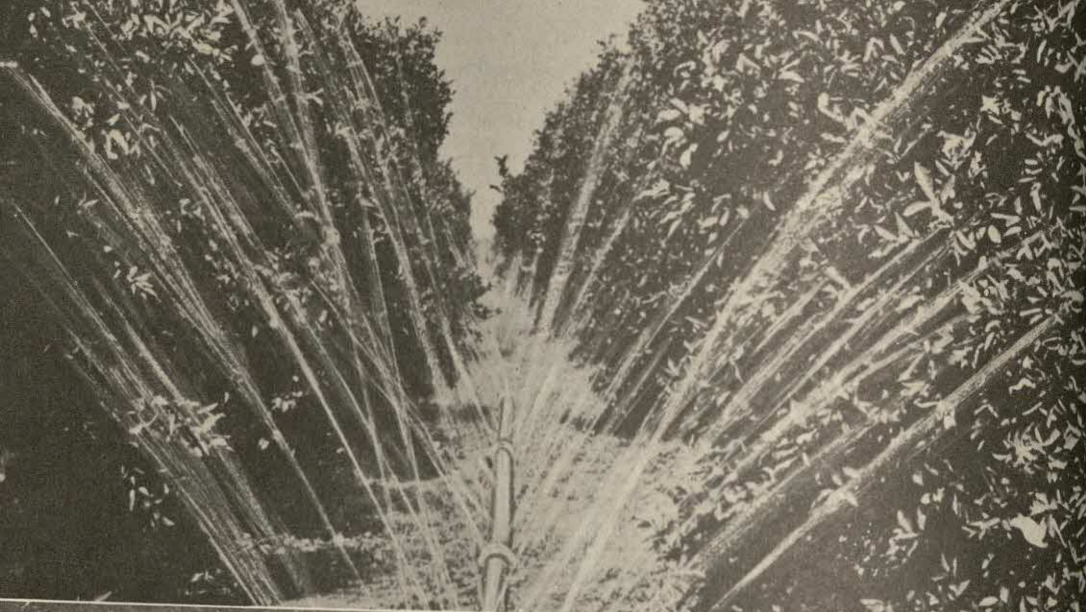


Ewing Galloway

WHERE IRRIGATION MEANS LIFE—A PHILIPPINE RICE FIELD

Oriental peoples depend on rice as their chief food; long have practiced irrigation.

IRRIGATION, *ir i ga'shun.* All plant life is dependent on the presence of water. More than half of the earth's surface receives rainfall insufficient to supply the soil with the water necessary for plant growth. In some localities water falls only during the winter season, the lack of a summer supply making it difficult to produce profitable crops. Many centuries ago it was found that artificial addition of water to soil to supplement insufficient or irregular rainfall both insured and increased the growth of crops. This practice is known as irrigation.



Aluminum Company of America

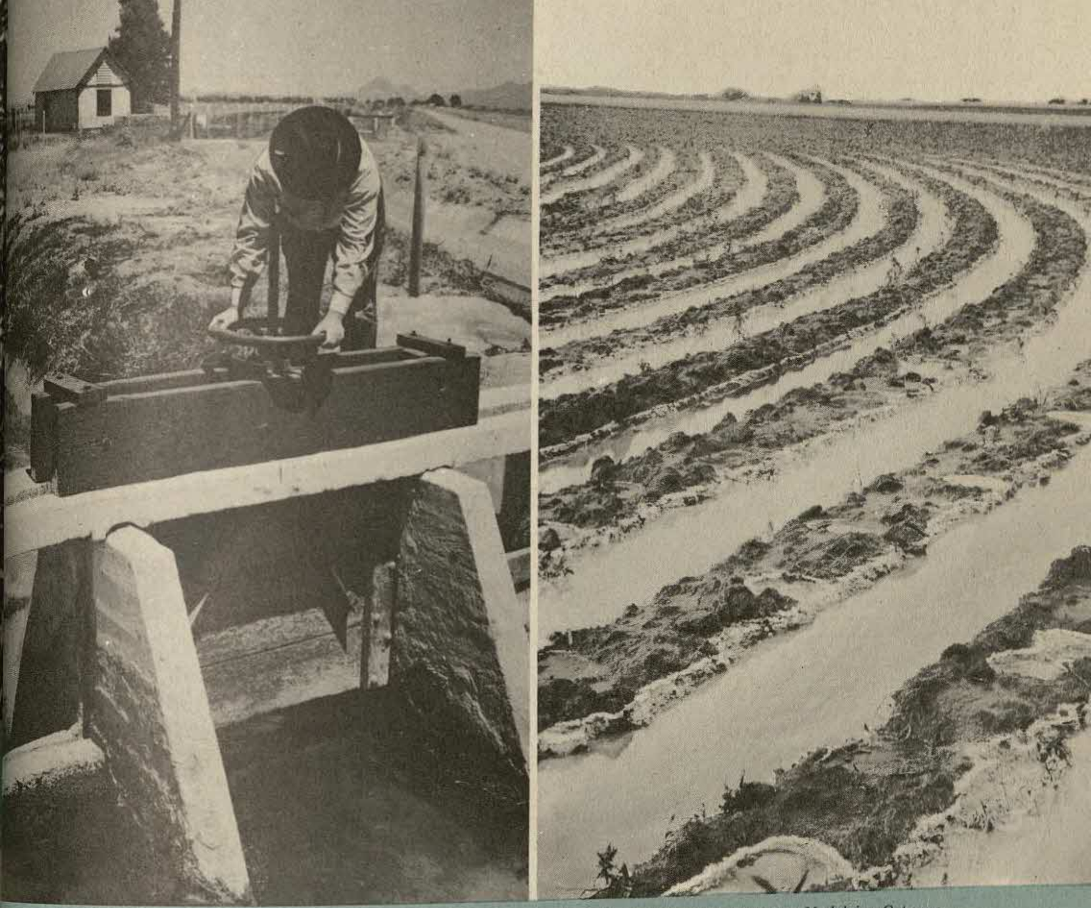
IRRIGATION OLD AND NEW

Above is a portable sprinkler system used in citrus groves. The device at left was invented by Archimedes in ancient Greece.

Sprinkling in greenhouses, overhead spraying of truck crops, running tiny streams through orchard furrows, periodical flooding of grain and alfalfa, and continuous flooding of rice—all these methods of sustaining plant growth by artificial application of water constitute irrigation practice.

History. Irrigation is not of recent origin; it is as old as civilization. It began long before histories were written. Whether irrigation originated in Asia, Africa, Europe, or America is not definitely known. The monuments of Egypt, Babylonia, and Assyria show that irrigation was a common practice in the Nile Valley and in the vast Mesopotamian plains when history was first recorded there. It probably has been practiced in these countries from 4,000 to 6,000 years. Likewise on the American continents, irrigation practice goes back to time immemorial. In Peru, Chile, Argentina, Mexico, and the United States, evidences of prehistoric irrigation practice were found by the first white settlers.

In the ninth and tenth centuries after Christ, the Moors invaded Southern Europe and greatly extended irrigation. Spain, France, and Italy, especially, added large areas to their agriculture by irrigation. In North America the Catholic mission fathers, many of whom were from Southern Europe, established irrigation practice at



U.S.D.A.; U.S.D.A. Photo by Madeleine Osborne

MAN HELPS HIMSELF — AND GIVES NATURE A HAND

At left, the gate in an irrigation canal is opened to let water run out to the fields where it is needed. At right, instead of flowing off or flooding a low spot, rain water is evenly distributed and held in place in a carefully planned field.

the missions in Mexico and California. They did not, however, succeed in establishing American irrigation on a community scale.

The beginning of modern irrigation in America on a permanent, community scale was made by the Mormon pioneers in Salt Lake Valley on July 24, 1847. Later a great stimulus was given irrigation by the colony whose members, in 1870, founded Greeley, Colo. From the humble beginnings in 1847, irrigation in the United States has grown to include large areas of irrigated land in all of the seventeen Western states and in many of the Eastern states.

The United States now has millions of acres under irrigation and some of the world's largest dams and reservoirs for supplying the water needed to make its dry lands productive. Irrigation is also extensively used in India, Pakistan, Egypt, Soviet Russia, western Canada, Australia, and South Africa.

The Source of Irrigation Water. Water for irrigation is obtained from rivers, ponds, lakes, and from under the ground, but the ultimate source of all irrigation water is the rainfall. In order to obtain enough irrigation water for fertile soils, it is necessary to use all of the precipitation that falls on many acres of mountainous and waste lands.

Irrigation Systems. Storage reservoirs, diversion works, and canals, with their spillways, wasteways, flumes, tunnels, and inverted siphons, comprise irrigation systems.

Those systems which divert water from its natural channels by dams and convey it by the force of gravity to the land needing water are called *gravity* systems. Those in which water is pumped from a low to a high level are called *pumping* systems.

A very large proportion of irrigation systems are of the gravity type, in which the water flows naturally from its source to the land that needs watering. Occasionally, gravity and pumping systems are combined, but as pumps are used on a comparatively small proportion of systems, only gravity systems are described here.

A typical river system, if the flow of water were reversed, conveys a mental picture of an irrigation system. In the irrigation system, water is diverted from its natural course and carried in a main canal toward the valley, where it is divided into *submains,* the submains into *laterals,* the laterals into *sublaterals,* the sublaterals into *farm ditches,* the ditches into *head ditches,* and the water of the head ditches into thin, spreading sheets of water which finally separate into many tiny, trickling drops hovering about numerous soil particles.

Some systems depend on the natural flow of streams for the necessary irrigation water. During the dry, hot summer when water is most needed, the streams contain the least, while excessive rainfall and melting of snow occur when water is not needed. To save the flood waters for irrigation, large reservoirs are constructed by means of dams placed across narrow outlets of small valleys.

Reservoir waters in many cases are commingled with the natural flow of streams for conveying to heads of irrigation canals. At the heads of the canals, massive obstructions are placed across the river to turn water into the canals. These obstructions, called *diversion weirs,* are really water-loading stations, to load water into its conveyors—the canals.

Canals have spillways for the purpose of getting rid of excess water, and wasteways through which to divert entire streams in case of threatening danger or breaks likely to cause flooding.

Like railroads, canals have tunnels to avoid long distances, and to avoid difficult construction and short curves in steep mountain canyons. In some cases, tunnels are dug to convey water from one watershed to another; such, for example, is the United States Reclamation Service Strawberry Tunnel in Utah, which takes water, underground, 19,897 feet from the Colorado River Basin into the Great Basin. Canal waters are sometimes conveyed across deep depressions through inverted siphons.

IRVING, WASHINGTON (1783-1859), first American author to win world-wide fame. He began his career as a lawyer but published his first important book in 1809, *Knickerbocker's History of New York.*

Irving traveled a great deal in Europe. After failing as a businessman, he decided to devote his full time to writing. His first publication after this decision was *The Sketch Book of Geoffrey Crayon* which contained "Rip Van Winkle" and "The Legend of Sleepy Hollow." Among his other writings are *Tales of a Traveler, The Alhambra, Bracebridge Hall,* and *Life of Columbus.*

Irving spent much time in Europe, particularly in Spain where he served as United States Minister and gathered much material for his writing. During his later years, he lived in New York near the Sleepy Hollow region.

He also wrote a biography of George Washington, and completed one of Oliver Goldsmith just before he died. Irving's writings show much understanding of many different types of situations and the people who functioned in them.

ISAAC, *i′ zak,* son of Abraham and Sarah, one of the patriarchs of the Jews. See BIBLE STORIES.

ISABELLA OF CASTILLE (1451-1504), Spanish queen who assisted Columbus in preparing for his voyage to America. She was the daughter of John II of Castille. Her marriage to Ferdinand of Aragon created the modern Spanish state. See FERDINAND V; SPAIN.

ISAIAH, *i za′yah,* first of the Hebrew prophets. His name means salvation of Jehovah and he began his work in the reign of King Uzziah. The Book of Isaiah in the Bible is his warning to the Jewish people and a prediction of a glorious future for the Jews.

ISIS, worshiped in Egypt as the goddess of nature, considered by the early Egyptians to have taught their ancestors agriculture. She was the wife of Osiris, the sun god, and was worshiped with offerings of cereals and grains. Isis was later also worshiped by Romans.

ISLAM, *iz′ lam,* is the Moslem name for the religion often called Mohammedanism in the West. See MOHAMMEDANISM.

ISLAMABAD. See PAKISTAN.

ISLAND, *ī′land*. Islands differ widely in origin. Some are made by volcanoes. The ash or other matter issuing from a volcano on the sea floor can build up a cone high enough to rise above the water as an island. Another type of island is made by the sinking of a coast line, admitting the water into former valleys and cutting off the higher parts of the land as islands.

Before the days of the compass, islands were of great importance in trade and exploration. Without them Western Europe would have developed much more slowly. Being small areas surrounded by water, islands have a distinct type of climate which fits them for certain products. They are good for fishing quarters, and serve as coaling stations and strategic bases for navies and ships.

ISRAEL. The establishment of the Republic of Israel in 1948 brought into existence the first Jewish state since the Romans took Jerusalem, A.D. 70. The return to Zion (Jerusalem or the Holy Land) had for almost 2,000 years been the fervent hope of traditionally religious Jews. From 1897 an organized Zionist movement strove to establish a Jewish state in Palestine. The British Government in 1917 sponsored "the establishment in Palestine of a national home for the Jewish people." The General Assembly of the United Nations in 1947 approved the establishment of a Jewish state in Palestine. Great Britain gave up its mandate over Palestine on May 14, 1948. The state of Israel was proclaimed immediately by a Provisional State Council. The date is celebrated as Independence Day in Israel.

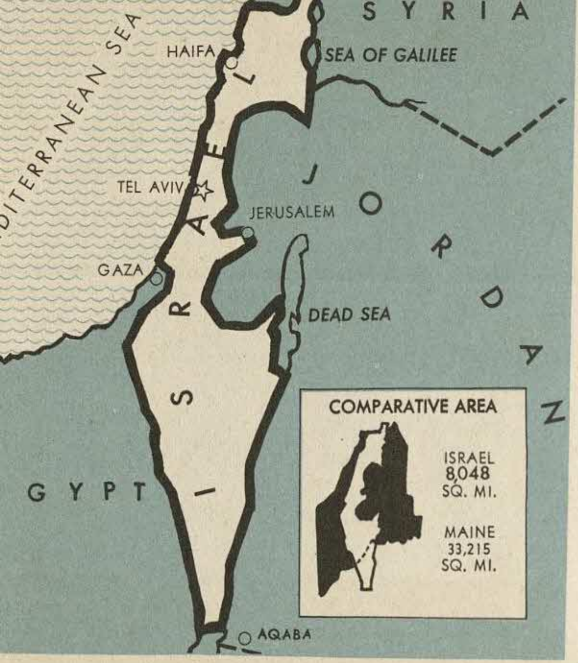
INS

ISRAELI TROOPS ON PARADE

The Israeli Army is a small, efficient, hard-hitting force. It is a citizen army, composed of men and women who serve as military trainees and then as reserves. The army does important work in education, agriculture, and forestry. In the frontier region, army service is combined with farming.

Land and Climate. Israel is located at the southeast corner of the Mediterranean Sea. It is bounded on the north by Lebanon, on the east by Syria and Jordan, on the southwest by Egypt's Sinai Peninsula, and on the south by the Gulf of Aqaba, an arm of the Red Sea. The land has four main regions: the coastal plain, the plateau and hill country, the eastern wilderness, and the southern desert. Israel's weather is hot and dry in summer and cool and wet in winter, with a rainy season from October to May.

The People. Israel has a population of about 2,100,000, of which about 1,875,000 are Jews. Most of these are Ashkenazic Jews, from Eastern and Central Europe; the rest are Sephardic Jews, from North Africa and the Near East. There are also about 225,000 non-Jews, of whom about 200,000 are Chris-



tian and Moslem Arabs. The rest are Druses.

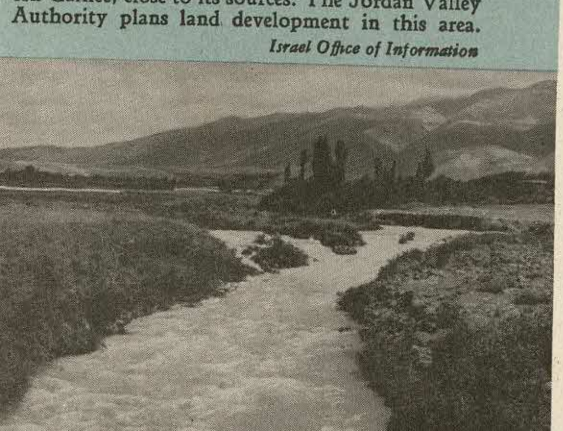
Agriculture. Making former wastelands flower into fine croplands has been one of the most notable achievements of the new state. The Israelis use the latest scientific methods and farm machinery to reclaim and enrich the soil and plant, cultivate, and harvest crops. Collective and co-operative settlements have done a great part of the work on Israel's land. In some settlements, members own and work the land in common. In others, small landowners help one another. Private free-enterprise farming also plays a role in Israel's farm production. Crops are usually sold through marketing co-operatives.

Israel's main grain crops are barley, wheat, durra, millet, sesame, and rice. Other crops are peanuts, soybeans, potatoes, tobacco, melons, cantaloupes, sugar beets, and sugar cane. Alfalfa, clover, and vetch provide fodder. Israel produces many kinds of fruit: grapes, apples, pears, peaches, plums, apricots, oranges, grapefruit, and lemons. Livestock includes cattle, goats, sheep, horses, mules and donkeys.

Mining. The Dead Sea is Israel's main source of mineral wealth. The Dead Sea Works, Ltd., extracts potash, carnallite, bromides, magnesium chloride, calcium chloride, and sodium chloride (salt) from the salt water. On nearby hills lie deposits of rock salt, sulfur, and chromium. The Israel Mining Corporation directs research and exploitation of resources in the Negev wasteland region in the south. Oil has been produced there since 1955. Limestone quarries near Jerusalem and Haifa furnish building materials. Israel's mineral deposits include copper, gypsum, manganese, and phosphate rock.

Manufacturing. Israel's basic industries are textiles, diamond finishing, sugar refining, woodworking, and pharmaceuticals. Food industries are fruit and vegetable canning, flour milling, baking, and the extraction of olive and citrus juices. Israel also manufactures cigars and cigarettes, electric goods, plastics, perfumes, leather goods, precision instruments, and clothing.

Transportation. Israel's best harbor is at Haifa in the Bay of Acre, where ocean liners dock. Jaffa-Tel Aviv has port facilities for smaller vessels. A new port at Elath on the Gulf of Aqaba has been developed. Israel's ports handle over two million tons of freight per year. Israel has a small merchant fleet. The chief railroad runs from Haifa to Rafa. Branch lines run to the Gulf of Aqaba, the Lebanese border, Jerusalem, and Jaffa-Tel Aviv. Headquarters for Israel's air transport is at Lod airport near Tel Aviv. The Israeli airline El AL makes flights to many countries. Israel has thousands of miles of



THE UPPER JORDAN VALLEY

The Jordan is the great river of Biblical history and faith. Above is a view of the river in Northern Galilee, close to its sources. The Jordan Valley Authority plans land development in this area.

Israel Office of Information

paved roads.

Education and Culture. Primary schooling is free and compulsory. There are separate school systems for Jewish and Arab students. Jewish elementary schools are of four types: general, labor, religious, and private. Students in high schools and colleges must pay tuition fees. Hebrew University in Jerusalem is world famous. Other important schools are the Institute of Technology, the Weizmann Institute of Science, Tel Aviv University, and the religious Bar-Ilan University. Israel is a nation of readers. Publishers of books and magazines do a thriving business. Cultural institutions abound, including theaters, opera companies, libraries, and museums. The Habimah National Theater and the Israel Philharmonic Orchestra are world-famous.

Religion. A government ministry (department) supervises religious affairs. Each religious community administers its own affairs, including marriage, divorce, and wills. The Jewish Sabbath and Holy Days are official days of rest. Freedom of worship and conscience is guaranteed to all religious faiths.

Labor. The Histadrut, or General Federation of Jewish Labor, handles social welfare, production, and finance, as well as labor union affairs. It has a giant co-operative marketing society, the largest contracting firm in the Middle East, banks, insurance systems, and fishing settlements. It played an important military and political role in the making of Israel, and is one of the important centers of social and political power. Several smaller labor organizations exist.

Government. Israel is a republic headed by a President. The President is elected to a five-year term by the Knesset, or Assembly, a one-chamber parliament. The Knesset is elected by the people to a four-year term. An executive council representing a majority of the Knesset administers government affairs. The council consists of the Prime Minister, heads of departments, and ministers without portfolio. Israel is divided into five main administrative districts. Local governments include municipal corporations, local councils, and regional councils. The judicial system includes a Supreme Court, district courts, magistrates' courts, and municipal courts.

History Since Independence. Forces from the Arab states of Egypt, Lebanon, Jordan, Iraq, and Syria attacked Israel as soon as it was proclaimed. Israel was victorious and gained much land. It was soon recognized by the great powers and became a member of the United Nations. Menacing border conflicts continued with the Arab states, and Egypt denied Israeli shipping the use of the Suez Canal. In October, 1956, Israeli forces took the Sinai Peninsula and the Egyptian-controlled Gaza strip, a constant source of trouble. Great Britain and France intervened against Egypt. The United Nations took police action and made the occupying powers withdraw. It took over patrol of the borders between Israel and Egypt and administration of the Gaza strip. The attitude of the Arab states continued to be menacing, although there was a decline in armed border clashes.

Arab leaders have always opposed the

Israel Office of Information

WORKING THE LAND

Israel's soil gets patient care, so that its people may live. Children, too, help in this task. The boy and the girls above are preparing the land on their school farm in a collective settlement.

Israel Office of Information

HAIFA, ISRAEL'S CHIEF SEAPORT

This modern city lies at the foot of Mount Carmel, on the Bay of Acre. The development of the Jewish homeland changed Haifa from a provincial town to a thriving city, the second largest in Israel. It is a center of industry and land transportation, as well as of shipping.

establishment of a Jewish homeland in Palestine. They regard Israel as an agent of the West in the struggle for power in the Middle East, and as a threat to traditional Arab culture. The Arab states claim that the Jews forced most Palestinian Arabs to flee during the 1948-1949 fighting and would not permit them to return to their homes. Israel claims that the Arabs were enemies of the new state, who left at the suggestion of their leaders and of their own free will.

Language, Flag, and Anthem. Hebrew is Israel's official language. The ancient tongue is now the spoken language of a modern nation and is the source of a new literature. The Israeli flag is white with two horizontal blue strips, and the Blue Star of David in the center. The national anthem is *Hatikvah,* or *The Hope.*

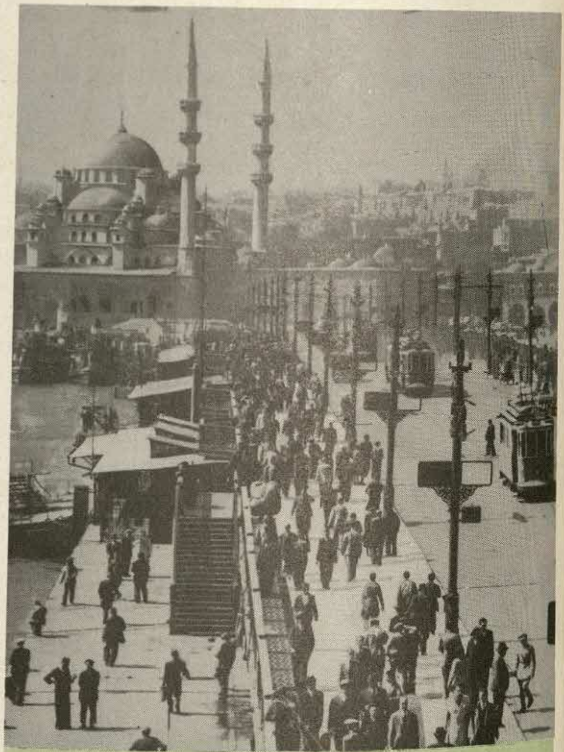
ISTANBUL, *e stahn bool',* the modern name for Constantinople and the largest city in Turkey. When World War I ended in 1918, the name Istanbul was adopted. The city ceased to be the capital of Turkey after the country became a republic in 1922. It is now a Turkish educational and cultural center and still important because of its position on the Bosporus. See CONSTANTINOPLE.

ISTHMUS, *is' mus,* a strip of land connecting two large land areas. Usually, it is a barrier to travel but a valuable trade route can be developed by cutting the land with a canal. See CANAL.

ITAL'IAN LANGUAGE. The Italian language possesses great beauty and power of expression. The fact that it can be adapted to melody with great ease accounts for the world-wide appeal of Italian opera. It is a natural language for singing.

Its origin is in the Latin dialects spoken in Italy after the fall of the Roman empire. Tuscany was the first part of Italy to develop the language in such a way that the production of literature could be brought about.

ITALIAN SOMALILAND. See SOMALILAND.



THE CITY OF THE GOLDEN HORN

The modern and the ancient rub shoulders in the city of Istanbul, Turkey. This view from the suburb Galata shows the bridge leading across the Golden Horn, an inlet of the Bosporus. In the distance are the domes and spires of Stamboul, the oldest section of Istanbul.

ITALY—*Where Old and New Meet and Merge*

ITALY. Extending into the blue Mediterranean Sea in the shape of a gigantic boot is the peninsula of sunny Italy, land of the ancient Romans and of some of the greatest statesmen, artists, and literary geniuses whom the world has ever known. Here is found the work of Leonardo da Vinci, Raphael, and Michelangelo. The Renaissance, the rebirth of civilization, began in Italy, and from Italy learning and culture spread to other lands.

The story of Italy's glorious though turbulent history runs from the time of ancient man through the reign of the Caesars and the Borgias and Mussolini's dictatorship to the postwar republic. It is an ever-changing country; yet its contributions to civilization will always remain. And Vatican City, in Rome, the home of the Pope, is of supreme religious interest to all the Roman Catholics of the world.

Area and Population. Italy proper, including the islands of Sicily and Sardinia, has an area of 116,235 square miles. The population is about 49,000,000. In 1939, the four Italian provinces of Libya, in North Africa, with an area of about 213,800 square miles, were incorporated in the national kingdom; the territory of Libyan Sahara was not included. Albania was under Italian sovereignty from 1939 until the surrender of Italy to the Allies in 1943. Ethiopia was part of Italy's East Africa Empire from 1935 to 1941. By the terms of the peace treaty, Italy lost its colonial empire, including Libya, and also Trieste, which came under international control.

Physical Features. Geographically, Italy can be divided into three distinct regions. The first is situated within the mainland of Europe. Here lie the towering Alps and their foothills on the south. The second is the broad valley of the Po River, which is one of the richest agricultural regions in Europe; and the third is the peninsular section extending to the southeast, with its mountain range running through the center. The Apennines run the length of the country, forming two slopes, one facing toward the Mediterranean on the west and the other toward the Adriatic on the east. On the island of Sicily is the famous vol cano of Mount Etna, and the ever-active Mount Vesuvius overlooks the Bay of Naples.

With the mountain regions so well distributed, Italy has a large number of rivers, the greatest of which is the eastward-flowing Po. Other rivers are the Arno, Tiber, Adige, Brenta, Piave, and the Tagliamento. Both in the Apennines and the Alps are many beautiful lakes, including Como, Albano, Averno, Maggiore, Garda, Lugano, and Iseo.

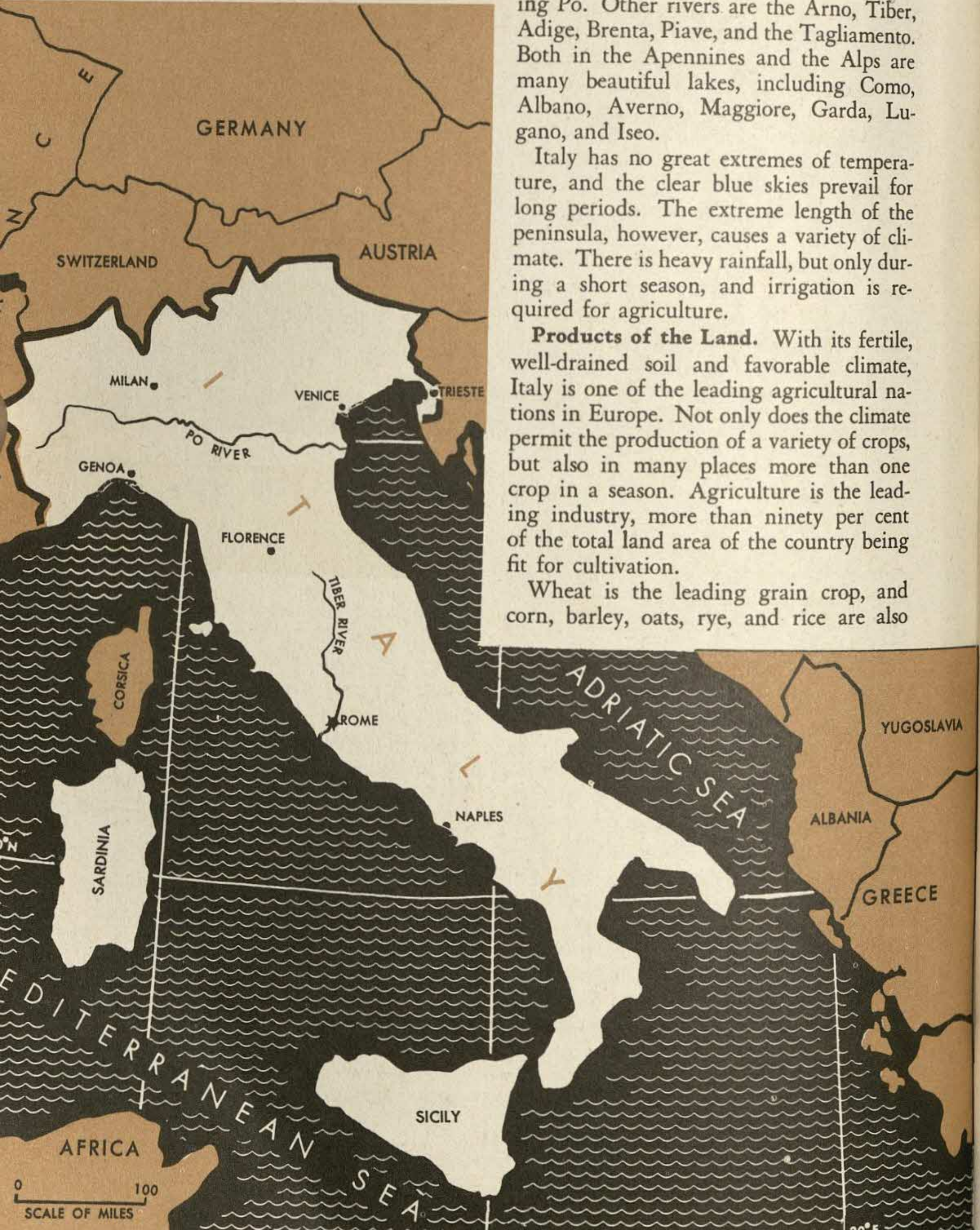
Italy has no great extremes of temperature, and the clear blue skies prevail for long periods. The extreme length of the peninsula, however, causes a variety of climate. There is heavy rainfall, but only during a short season, and irrigation is required for agriculture.

Products of the Land. With its fertile, well-drained soil and favorable climate, Italy is one of the leading agricultural nations in Europe. Not only does the climate permit the production of a variety of crops, but also in many places more than one crop in a season. Agriculture is the leading industry, more than ninety per cent of the total land area of the country being fit for cultivation.

Wheat is the leading grain crop, and corn, barley, oats, rye, and rice are also

EUROPE'S HISTORIC "BOOT"

From its northern boundary to its tip, the Italian peninsula thrills the visitor with endless reminders of its glorious past and evidence of its vigorous present.



grown. Other important crops include cotton, tobacco, flax, hemp, sugar beets, alfalfa, soybeans, and potatoes. Italy supplies early vegetables to northwestern Europe and exports almonds and other nuts. Being Europe's largest silk producer, it also raises many mulberry trees, on whose leaves silkworms feed. It is most noted for its many fine fruits, including oranges, lemons, figs, pomegranates, apples, peaches, apricots, grapes, and olives, one of its chief exports. Dairy farming also is important, and Italy is famous for its excellent cheeses (see CHEESE).

Despite the extent of the country's agriculture and the variety of its products, its farmers have long been so exploited by their landlords that most of them have lived in poverty. An extensive land-reclamation program, carried on before World War II, and land reforms, started in 1951, are, however, improving their lot.

Minerals. Italy is famous for its building marbles and other stones, and especially for the white statuary marble quarried at Carrara. It has alabaster for making its fine decorative wares; clays for its noted faience, majolica, and other potteries; and white sand for making the famous glass of Venice. It also leads the world in mercury production and is second to the United States as a sulphur producer. The scantiness of coal and iron ores is a great handicap, but the country does produce some manganese, copper, lead, zinc, antimony, bauxite, and other minerals.

Manufacturing. Next to agriculture, the making of silk, cotton, woolen, and synthetic textiles is Italy's greatest industry. It also manufactures chemicals, electrical goods, steel, and metal products, including automobiles. Among its food industries are sugar refining and the making of cheeses, olive and vegetable oils, wines, and *pastas,* including macaroni and spaghetti. In recent years Italy has become famous for its fashionable clothing and accessories, such as shoes, handbags, and gloves. But the country has never become a center of heavy industry, largely because of its lack of iron, coal, and other minerals. It has, however, an abundance of cheap labor and of hydroelectric power, generated by its mountain torrents. Too, its people have long been famous for such artistic products as mosaics, enamels, jewelry, carvings, tooled-leather wares, straw goods, embroideries, laces, violins and other musical instruments, and coral and filigree ornaments.

Italian State Tourist Office

FLOATING FRUIT PEDDLER

In Venice, the milkman also travels by boat, accompanied through the canals by his cow.

Transportation. Italy has excellent motor roads, many noted for their scenic beauty. It has a good railway system, domestic and international air service, a merchant marine, and de luxe passenger vessels.

Italians and Their Institutions. Many Italians are short, with olive skins and dark hair and eyes, but others are blonds. They are noted for their love of art and music. Most of the population is made up

Ewing Galloway

TWA

PAST AND PRESENT MINGLE STRANGELY IN THE ITALY OF TODAY

A chasm-like tenement street in Naples, and modern travel on Rome's ancient Appian Way.

of native Italians, with only a small number of other nationalities.

In religion, most Italians are Roman Catholics. Protestants, Jews, Moslems, and other groups make up less than one per cent of the population. Vatican City is the center of the Roman Catholic world.

Italy is famous for its contributions to education. The modern Montessori method in teaching comes from Rome, and in Italy are some of the oldest universities in the world. These include the University of Bologna, the University of Pavia, founded possibly as early as 825, and several others that date from the fourteenth century or earlier. Education in Italy is entirely regulated by the government. Elementary education is free and attendance is required from six to fourteen years of age. Many of the secondary schools are privately owned. There are also numerous schools of art and music.

The government of Italy was in the hands of one man, Benito Mussolini, from 1922 until his arrest in July, 1943. In September Italy surrendered unconditionally to the Allies. King Victor Emmanuel abdicated in favor of his son, Crown Prince Umberto, in June, 1944. In 1945, the Allied Control Commission, set up after the surrender to supervise the Italian government, relaxed its rigid control. The next year, the people voted for a republic; Luigi Einaudi was elected its first President in May, 1948. Victor Emmanuel and Umberto went into exile to Egypt.

Cities and Colonies. The center of activity in Italy is Rome, the "Eternal City," which at one time was the center of the vast Roman Empire. The second largest city is Milan, followed by Naples, Genoa, which is Italy's leading seaport, Turin, Palermo, Florence, and Venice.

Besides Libya, Italy's colonial possessions in Africa included Eritrea, Italian Somaliland, and Ethiopia (Abyssinia). Ethiopia regained its independence in 1941, and the other colonies were lost to Italy by the terms of the Italian peace treaty in 1947.

History. Italy was first inhabited by the Etruscans, the Latins, the Umbrians, the Sabines, and other tribes. The Latin tribes finally became the most powerful, and it was they who built up the Roman Empire. The history of modern Italy really begins with the fall of Rome in 476, when the great Italian city states started their rise to power. Italy became a united country under the rule of Theodoric, king of the Ostrogoths, in 493, and for many years enjoyed great prosperity. However, in 552 the country was conquered by the Byzantine Empire. Later the Lombards pushed down into the peninsula from the north.

The end of the Lombard rule came in the middle of the eighth century, when the Lombards were defeated by the Franks in their attempt to take Rome. Pippin, the Frankish king, gave considerable territory to the Pope, an event which marked the rise to power of the Roman Catholic Church. Charlemagne conquered the country of the Lombards in 774, and twenty-six years later, in 800, was crowned emperor of Rome by the Pope, being considered, in theory, a successor of the emperors headed by Augustus. In 843 Lothair, grandson of Charlemagne, became the ruler of Italy, and for the following hundred years the country was in a state of upheaval. In 962 the Holy Roman Empire was established when Otho I of Germany became the emperor of Rome (see HOLY ROMAN EMPIRE).

During the next 200 years the Italian people constantly rebelled against their German masters, who were not overthrown until the beginning of the fourteenth century. In the meantime, two strong groups, known as the Guelphs and the Ghibellines, arose within the country. The Guelphs

UPI

ITALIAN STREET SCENES

Beneath towering apartment buildings, above, a shepherd takes a short cut for his flock through a busy street in Rome. Below, at a sidewalk shop, woman displays handmade laces.

By Burton Holmes from Ewing Galloway

Italian State Tourist Office

ST. PETER'S IN VATICAN CITY

This largest of Christian churches is in a tiny independent state within Rome.

demanded a free Italy; the Ghibellines supported the emperors. The conflict between these two factions upset the peace of the country for many years. The Guelphs finally emerged as victors.

Until the end of the fifteenth century, Italy was a divided country, made up of a number of powerful city states. The beginning of the next century saw the first attempts of French and German emperors to gain control of the city states. This struggle reached a climax in 1525, at the Battle of Pavia, when the Germans defeated the French and took over the governments of several states. All was relatively peaceful in the peninsula for the next century and a half. During this period, Spain acquired Milan and Naples, but later was forced to relinquish them to Austria in exchange for Sicily.

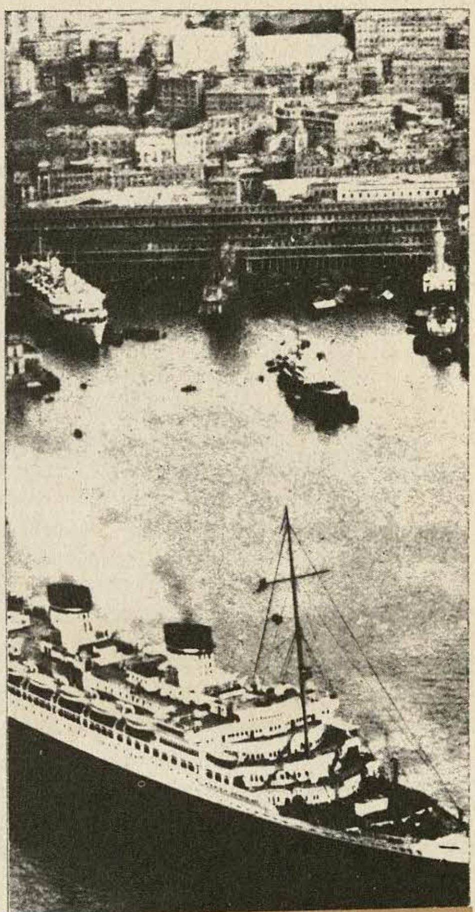
By the end of the eighteenth century, France and Austria were again battling for control of the peninsula. In 1796 Napoleon swept through Northern Italy, driving out the Austrians. A year later Napoleon relinquished Venice to Austria by the Treaty of Campo-Formio and created a number of republics from the remainder of the country. Until Napoleon's downfall in 1814, Italy was largely under the control of France. However, the Congress of Vienna in the following year stripped France of all her possessions, and Italy was given to Austria and the Pope.

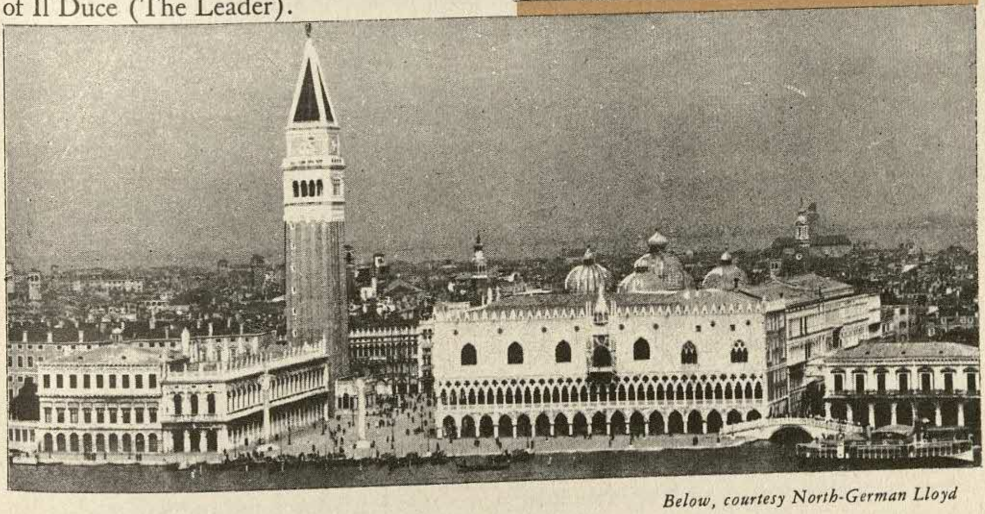
Seeing in this situation the end of all hope for a united and independent Italy, the Italian people organized many insurrections. The movement toward a united country gained much ground when Charles Albert became ruler of Sardinia in 1831. In the following years Mazzini led the cause of unification, and by 1848 the people of Rome, Sardinia, and Naples, inspired by the revolutions that swept Europe in that year, succeeded in obtaining constitutional governments. The Austrians were driven out of Milan and barely escaped defeat at the hands of Charles Albert in Lombardy. Charles Albert's failure, however, weakened the movement, and only in Sardinia were the advances toward freedom retained.

Victor Emmanuel II succeeded Charles Albert as king of Sardinia, and he, together with his Prime Minister Cavour, kept the flame of freedom alive. In 1859 Sardinia joined France in a war against Austria, and drove that power from Milan and Northern Lombardy. This war might have accomplished Italy's freedom had not Emperor Napoleon III concluded the Peace of Villafranca. A proposed union of all Italy under the Pope was rejected, but in 1860 Tuscany, Modena, and Parma united with Sardinia. In May, 1860, Garibaldi, leading a thousand men, conquered the Kingdom of the Two Sicilies, which then became a part of the Kingdom of Italy under the rule of Victor Emmanuel. Later, Austria ceded Venetia to Italy, following its defeat by Prussia in the Seven Weeks' War. Garibaldi attacked Rome, but France prevented it from becoming a part of Italy. However, in 1870, when France withdrew its protection, Rome was taken by Italian troops, and in 1871 was made the capital of the united country. Humbert, son of Victor Emmanuel II, became king in 1878, and in 1900 he was succeeded by his son, Victor Emmanuel III.

Italy entered the Triple Alliance with Austria and Germany in 1882, agreeing to aid these two countries in case they were attacked. However, in World War I, Italy withdrew from this alliance, claiming that Germany and Austria had been the attackers and not the attacked. It entered the war on the side of the Allies in May, 1915. At the close of the struggle, Italy received part of Austria's territory.

World War I left Italy in a weakened condition. The country's finances had been depleted, responsible government had collapsed, and the people bitterly resented the fact that the Allies had not given Italy all the territories which had been promised. Several Cabinets fell through lack of popular confidence in the government. Out of this chaos arose the strong figure of Mussolini, who, as leader of the Fascists, guaranteed to restore prosperity and economic stability. Following a march on Rome by 50,000 "black shirts," Mussolini was appointed Premier by King Emmanuel III in October, 1922. Thus began the dictatorship of Il Duce (The Leader).





Below, courtesy North-German Lloyd

MERCHANTS TO THE ANCIENT WORLD
Genoa (above) and Venice (below) still hear the familiar bustle of busy seaports.

During Mussolini's dictatorship, all the activities of the nation were under the control of a government completely in the hands of the Fascists.

In 1929 Mussolini reached an agreement with Pope Pius XI whereby Vatican City was established with the Pope as temporal sovereign. Il Duce seized Ethiopia in 1935 and incorporated it in Italian East Africa. Co-operating with Hitler, he supported the Fascists in the Spanish Civil War (1936-1939). In April, 1939, he annexed Albania and in May became a military ally of the Nazi dictator. He remained a non-belligerent in World War II until June, 1940, when his declaration of war on France and Great Britain brought him into the conflict. The disastrous campaign in Africa lost Italian East Africa to Italy in 1941 and opened the way to the Allied conquest of the Italian peninsula—a conquest that was virtually complete before Germany collapsed in May, 1945.

Mussolini had been deposed in 1943, shortly before Italy's surrender to the Allies; he was executed by Italian partisans in April, 1945. Italy became a republic in 1946 and signed the peace treaty with the Allies in 1947. In 1954 Italy was awarded Zone A of Trieste, ending a nine-year dispute with Yugoslavia. Italy joined the Western European Union in 1954.

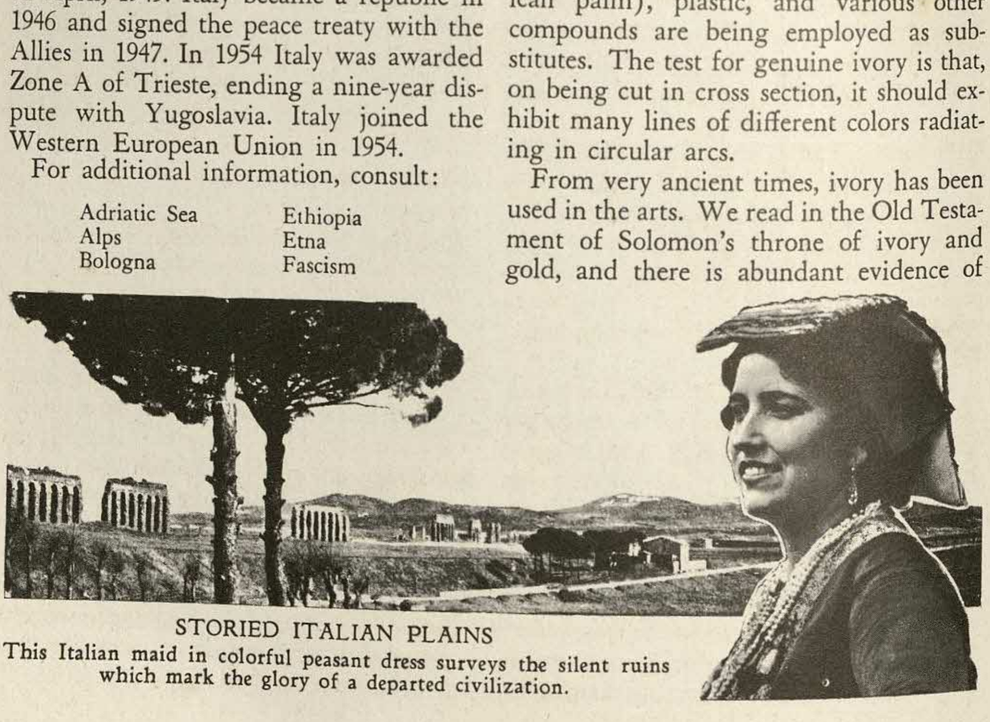
For additional information, consult:

Adriatic Sea
Alps
Bologna
Ethiopia
Etna
Fascism
Florence
Garibaldi, Giuseppe
Herculaneum
Literature
Mont Blanc
Mussolini, Benito
Naples
Painting
Pope
Rome
Sculpture
Sicily
Sicilies, Kingdom of the Two
Tiber
Vatican City
Venice
Vesuvius
Victor Emmanuel II
Victor Emmanuel III
World War (I, II)

I'VORY. Elephants, particularly the male African elephants, supply tusks that make the world's best ivory, but tusks of the walrus, hippopotamus, and narwhal are also used, as well as fossil ivory found in Siberia. This fossil ivory is the tusk of the ancient mammoth.

Ivory is familiar to almost everybody. It is the material of which are made billiard balls and piano keys in choice old instruments. It is also used in the manufacture of combs and brushes, toilet articles, knife handles, and chessmen. Lately, however, as the supply of real ivory is gradually diminishing, less and less of the genuine material is being used for these purposes. Vegetable ivory (the nut of a South American palm), plastic, and various other compounds are being employed as substitutes. The test for genuine ivory is that, on being cut in cross section, it should exhibit many lines of different colors radiating in circular arcs.

From very ancient times, ivory has been used in the arts. We read in the Old Testament of Solomon's throne of ivory and gold, and there is abundant evidence of



STORIED ITALIAN PLAINS
This Italian maid in colorful peasant dress surveys the silent ruins which mark the glory of a departed civilization.

THE DARK CONTINENT'S WHITE GOLD
The tusks of the elephant provide beautiful ivory, used largely in decoration. Notice the size of the tusks compared with the men (left).

the use made of it by the Egyptians and Assyrians. Later the Greeks and Romans took up the art of ivory cutting, and many statues and figures of rare beauty were fashioned by them. It is from the Orient, however, that the most exquisite ivory work has come.

IVORY COAST, Republic of, is a nation formed from French West Africa. It faces the Gulf of Guinea and is bounded by the republics of Liberia, Guinea, Upper Volta, Ghana, and the Sudanese Republic. It became independent August 7, 1960. Its area is 123,200 square miles, and its population about 2,485,000. Its capital is Abidjan. It had been self-governing since 1958.

IVORY PALM, or TAGUA, *tah'gwah.* A low, tropical tree whose trunk lies on the ground is the ivory palm. On it grow huge clusters of fruits which often attain a weight of twenty-five pounds, each fruit containing six to eight large seeds. The kernels of these seeds are called *vegetable ivory* because in texture and hardness they are similar to ivory. These kernels have considerable commercial value, since they are used in the manufacture of doorknobs, buttons, umbrella handles, and other articles.

IVY. There is more than one species of ivy, but the one best known down through the ages is the *English* ivy, native to Europe. A climbing plant, it covers the walls of buildings to dress them in gorgeous green in the summer and bright red in the fall. It crawls up and over fences and twines about trees. It is a plant which lives for a long, long time, as Dickens told in his poem, saying—

Whole ages have fled, and their works decay d,
And nations have scatter'd been;
But the stout old ivy shall never fade
From its hale and hearty green.

The leaves of the English ivy have five lobes, and the plant bears small green flowers and berries either yellow or black.

In America the *Virginia creeper,* or *woodbine,* is considered an ivy. It is a trailing plant and crawls along the ground and along fences. The *ground* ivy is another trailer. Its leaves are rounded and its flowers are blue or purple. Another American species is the *Boston,* or *Japanese,* ivy. Like the English ivy, it is a climber, but its leaves have only three lobes.

J. With a history dating back only to the days of the Romans, *J*, the tenth letter of the alphabet, is a comparative newcomer to the family of letters. Although the sound of *J* had been used earlier, the letter *I* was used to represent it. The Romans, however, lengthened *I* to indicate a consonantal sound. From about the fourteenth century, *I* and *J* began to be considered as different letters. Finally, in the seventeenth century, the present form of *J* was adopted, and it has been used ever since that time.

JACKAL, *jak'awl.* A yellow doglike animal, with bushy tail dark at the outer end, the jackal is a carrion eater found in Asia, Northern Africa, and Southeastern Europe. Jackals roam in packs, feeding upon decaying animals of all kinds. They also eat fruits and other plant foods, and will kill small animals and birds if more easily obtained food is not available. Like the hyenas (see HYENA), they may dig open the graves of human beings to feast upon the bodies. For this reason, graves in regions where jackals are common are frequently covered with large stones.

Jackals live in burrows and caves. They work at night and commonly enter towns and villages to pick up stray scraps of food. They apparently enjoy howling in the middle of the night, like their domestic relatives, dogs.

JACK-IN-THE-PULPIT, or INDIAN TURNIP. A familiar woodland sight is the delicately fluted Jack-in-the-pulpit. Found along streams and in low, damp ground, this flower is a North American plant of the arum family.

Jack-in-the-pulpit grows from a turnip-shaped root, whose juice is very bitter. The curved, pulpit-shaped leaf at the top of the plant, called the *spathe,* surrounds a long, thin stalk, the *spadix.* About the base of this spadix are tightly clustered groups of blossoms. The plant blooms from April to June, and later bears red berries. In the fall, only the stem and these berries remain.

JACK'SON, ANDREW (1767-1845). "Old Hickory," as the seventh President of the United States was called, came from the common people, was elected by the common people, and devoted his life to making the Federal government serve the common people. He is today honored as one of the founders of the Democratic party. Unaffectedly honest himself, he firmly believed that the only requisite for politics

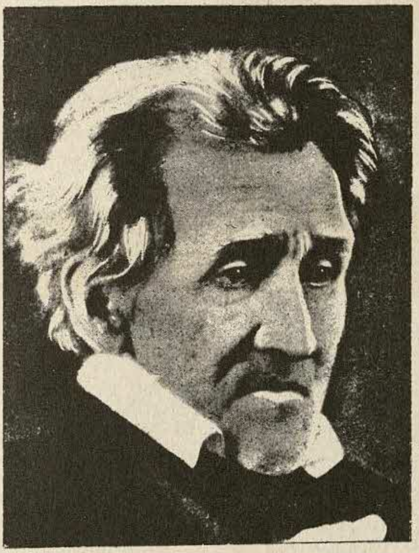
American Museum of Natural History

JUNGLE SCAVENGER
Kipling called yapping jackals "undertakers."

and government was honesty—that any honest man could hold a public office acceptably. He applied this theory to such a degree that he has been criticized as the originator of the "spoils system," the policy of filling government offices with men of the party in power.

As a matter of fact, Jackson merely carried on a system already established, but he enlarged it much beyond the point reached in previous administrations. However, the evils that developed—corruption and incompetence in office, and the abuse of the system by dishonest officials—could not have been foreseen by Jackson, whose acts were always dictated by his sincere belief that the will of the people should prevail.

As a man, Andrew Jackson was not well educated, and he had seen the rougher side of life in many of its phases, but he was courageous and forceful and made a personal appeal to the masses that has been equaled among American Presidents only by the two Roosevelts in the twentieth century. "Jackson Day dinners" are held annually in his honor.



ANDREW JACKSON
Seventh President of the United States
Administration: 1829-1837
A man of the people, Jackson was a frontier lawyer from Tennessee. He was a founder of the Democratic party; believed in party government.

Youth and Early Career. Andrew Jackson's father, for whom he was named, was a pioneer settler of the Carolinas, an Irish immigrant. He died a few days before the birth of his third son, which occurred on March 15, 1767. The exact spot of the Jackson home is not known, but it is thought to have been near Waxhawk Creek, Lancaster County, S. C. Mrs. Jackson, widowed and with three sons, had difficulty in supporting her family. Andrew, who was left much to himself, was a quick-tempered, self-willed boy, always ready to maintain his rights with his fists, and easily a leader among the neighborhood boys. When only fourteen, he enlisted in a colonial regiment, participating in the close of the Revolutionary War. In this conflict he lost both brothers, and his mother died from a fever, which she contracted while nursing American prisoners.

The young man, left entirely alone, managed to support himself and to study law. He was admitted to the bar in 1787, and by the time he was twenty-one, was appointed public prosecutor in the Tennessee district of North Carolina. There his firmness and honesty won him many friends, as well as some enemies—men with whom he disagreed on matters of principle. During this time Mrs. Rachel Robards, daughter of a local settler, became his wife.

When Tennessee was admitted to the Union (1796), Jackson took part in the framing of its constitution, and was sent as that state's only Representative to the lower house of Congress. He resigned in 1797 to seek election to the Senate. Again Jackson was successful, but within a year he resigned, resumed the practice of law, and was appointed to the state supreme court, where he served from 1798 to 1804.

Jackson, the Soldier. At the outset of the War of 1812, Jackson, at the head of 2,000 militiamen, offered his services. While he was getting his troops ready for action at Natchez, orders came to send them home. No funds were provided, and Jackson paid for their transportation himself, but later was repaid. A few months later, in command of a group of volunteers, he defeated the Creek Indians at Horseshoe Bend, Ala. In recognition of this victory he was made a major general and given a command in the Army of the South. The greatest battle of the war, fought at New Orleans, gave Jackson the opportunity to show the nation his mettle, for with exceptional skill and bravery he forced back a carefully planned British attack. The nation cheered and lauded the new hero, and the following April he became head of the Southern Division of the United States Army in the South.

In 1818, during trouble with the Seminole Indians in Florida (then owned by Spain), Jackson had two British subjects executed for inciting the Indians. He also seized the city of Pensacola. England protested the executions, and Congress unofficially called Jackson to account for his actions; but the matter was dropped when Florida was ceded to the United States in 1819, and Jackson became the governor of the territory in 1821. In 1823 Tennessee elected him to the Senate, and a year later the legislature of that state approved his name as a candidate for the Presidency of the United States.

Elections of 1824 and 1828. Following a bitter contest for the Presidency, four candidates, Jackson, John Quincy Adams, William H. Crawford, and Henry Clay, received votes in the electoral college, but no one obtained a majority, and the House of Representatives selected Adams. Jackson accused Adams and Clay of having made a bargain, and Adams resigned from the Democratic party to form the new National Republican Party (see POLITICAL PARTIES IN THE UNITED STATES). In the next election Jackson obtained a true majority. The path which began at a log cabin led finally to the White House.

Administrations (1829-1837). Thus began a new era of popular control. The colonial aristocracy relinquished the helm of the new nation, and with the aristocrats went the statecraft that had molded the Constitution and a co-operative Union. A general housecleaning followed the inauguration, and the spoils system became a reality. Congress then proceeded to pass a high tariff act, which was opposed by the South in the fear that it might injure the cotton industry. South Carolina adopted the famous resolution that the acts were "null and void" and could not be enforced in that state. The principle of nullification during this time was the topic for the memorable Webster-Hayne debate. Rumors of secession persisted from all quarters, and Jackson had the "Force Act" passed, empowering him to put the new tariffs into effect. With the sending of two warships to the harbor of Charleston, the authority of the Federal government was at least temporarily maintained. In 1833, with the passage of a compromise tariff measure, the controversy was settled for the time being.

Following the tariff controversy, another issue came to the fore, that of the Bank of the United States. Jackson opposed it and vetoed an act extending its charter beyond 1836. Following his re-election in 1832, he set about destroying the institution by withdrawing all Federal deposits and placing them in state banks. The Senate challenged the proceedings, but offered little resistance. Not content with upsetting the American banking system, the President issued the famous "Specie Circular" in 1836, requiring that public lands be paid for only in gold or silver. Paper money then in circulation, issued by local banks, became worthless. That condition, together with an inflation of credit due to loans made to the states, brought about the panic of 1837. The greatest financial crisis in the nation's history up to that time, however, did not break until Van Buren had succeeded Jackson.

Other events of the administration included the founding of William Lloyd Garrison's *The Liberator* and the rise of the abolitionists; the establishment of Texas as an independent republic; the organizing of the Mormon Church; and the founding of the *New York Sun* and *New York Herald,* the first cheaply priced newspapers. It was also the era that gave America the fine literature of Bryant, Hawthorne, Irving, Whittier, Longfellow, Cooper, Emerson, Holmes and Poe.

Jackson spent his last days in his home, the Hermitage, near Nashville, Tenn.

Consult the following titles for additional information:

Banks and Banking
Civil Service
Democratic Party
Nullification
Tariff
War of 1812

JACKSON, Miss. Capital and largest city of Mississippi, Jackson lies just forty miles east of historical old Vicksburg. It also serves as the county seat of Hinds County. A city of handsome public buildings, Jackson's most important structures are the state capitol, governor's mansion, state library, Federal building, and a number of institutions for the blind, deaf, dumb, and insane. Here, too, are found three small colleges, one of them devoted to the education of Negroes.

Because the city is the center of a great cotton and farming belt, its manufactures are mainly cottonseed oils, fertilizers, and farm implements. The city has excellent transportation, being served by five prominent railways. Jackson has the commission form of government. Its population is over 145,500.

JACKSON. Thomas Jonathan (1824-1863). Because one of the generals at the first Battle of Bull Run cried out to his men, "There stands Jackson like a stone wall," Thomas J. Jackson was ever after known as "Stonewall" Jackson. One of the bulwarks of the Confederate forces during the American Civil War, Jackson was the most capable of Lee's officers, so capable that Lee, mourning his death before the end of the war, said, "I have lost my right arm."

Jackson was born at Clarksburg, Va. (now W. Va.). He entered West Point at the age of eighteen, graduating in 1846. He saw immediate service in the Mexican War and was made a captain and then a major for conspicuous bravery. Leaving the army in 1851, he taught military tactics at the Virginia Military Institute until the opening of the Civil War.

GENERAL "STONEWALL" JACKSON

Although Jackson did not favor secession, his loyalty to his native Virginia led him to volunteer his services to the Confederacy when the war actually began. His courage and persistence in battle won important victories for the South.

He first received notice at Bull Run, where his Virginia brigade, although outnumbered, put up a valiant fight. Shortly after, he was made a major general. He participated in the Southern victories at McDowell and in the Shenandoah Valley, aided Lee in the defense of Richmond in June, 1862, and played an important part in the battles of Mechanicsville, Malvern Hill, and Cedar Mountain. He opposed General Pope at the second Battle of Bull Run and aided Lee when he first invaded the North. He proved himself an able officer at Fredericksburg and Antietam.

Jackson reached the height of his career at the Battle of Chancellorsville in May, 1863, where he made heavy inroads on the Union forces under Hooker. But shortly after this engagement he was accidentally shot by his own men while on a reconnoitering trip, and died a few days later.

JA'COB. Jacob, the son of Isaac, was the last of the Jewish patriarchs. The twelve tribes of Israel took the names of Jacob's ten sons and two grandsons. Jacob is known as the founder of Israel. See BIBLE STORIES.

JACOBINS, *jak'o binz.* Active during the upsetting days of the French Revolution, the Jacobins were members of a famous political club. Beginning at Versailles as the Club Breton in 1789, the organization later set up headquarters at Paris. Because its meetings were held in the Jacobin monastery, it came to be known as the Jacobin Club.

The Jacobins became the dominating force of the Revolution, and branches of their society were formed all over France. Although at first many conservative men were members, the Jacobins became more and more radical as the Revolution progressed. They brought about the formidable Commune of Paris and, under the leadership of Robespierre, staged a Reign of Terror in 1794. Upon the downfall of Robespierre, however, the Jacobins were overthrown. See FRENCH REVOLUTION.

The word *Jacobin* is sometimes used today in referring to a person who has radical political views.

JACOBITES, *jak'o bites.* Scattered throughout Syria, Babylonia, and Mesopotamia are the Jacobites, a Christian sect of Asia Minor. The group is named from Jacob Baradaeus who, in the reign of Justinian, gathered the scattered followers of this creed into a unified organization. The Jacobites, headed by the Patriarch of Antioch, deny the human nature of Christ.

The name of Jacobites was given to supporters of James II and Stuart claimants after the Glorious Revolution of 1688.

JADE. Two greenish minerals used as gem stones are called jade, *jadeite* and *nephrite.* They are both about fifty-eight per cent silica. Nephrite contains, in addition, lime and magnesia, and jadeite is made up of silica, alumina, and soda. There are besides, small amounts of other minerals present. It is iron that imparts the green color to nephrite; chromium gives jadeite its green hue. Jade is highly prized by the Chinese, by whom it is carved into ornaments of most intricate pattern. It is a compact, tough, hard mineral rather rare in its occurrence. It has long been used by man for ornamental purposes, as shown by excavations of prehistoric villages.

JAFFA, *yahf'fah,* **or YAFA,** ISRAEL. Located on the sloping shores of the Mediterranean, thirty-one miles northwest of Jerusalem, is Jaffa, today, as for about 3,000 years, a city of commercial importance.

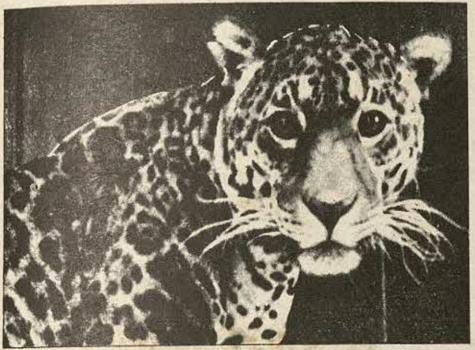
Known as Joppa in ancient times, it was even then an important seaport, probably the port through which the sea-borne commerce of Solomon's kingdom was carried.

The stranger alighting in Jaffa is immediately impressed by the interesting architecture of the buildings. Outstanding among them are the hotels, churches, mosques, and hospitals. The exports of Jaffa are made up chiefly of wines, sesame, wool, and fruits, but a few manufactures are also exported.

One of its suburbs, Tel Aviv, is modern in every respect and has been built by Jewish capital. In October, 1949, Jaffa, then included in Arab Palestine, and Tel Aviv were merged, by decree of the Israeli Cabinet, as Jaffa-Tel Aviv. The population of the combined city is about 400,000.

JAGUAR, *jag'wahr.* Large and powerful, the jaguar is a big cat of the wilds of tropical South America. Its range extends northward through Mexico to the Grand Canyon region of Northern Arizona. Jaguars at present within the borders of the United States, however, appear to be wanderers which have strayed, in accordance with their wide ranging habits, northward from their more usual range.

The ground color of the jaguar is a tawny yellow splotched with irregular, black spots over head, back, and tail, while the sides are marked by rounded rosettes, each consisting of a central black dot surrounded by a lighter zone and, outside this, petal-like spots of black forming an irregular circle. Like most of the cats, jaguars are



TROPICAL AMERICA'S "LEOPARD"
Golden-yellow, spotted jaguar of the jungle.

shy and timid, but their large size, great strength, remarkable swiftness, and ferocious looks make them objects of terror. They are nocturnal in habit and feed largely upon birds and small animals, although they often kill ranch horses and cattle.

JAMAICA, *juh mā′ kuh,* largest island in the West Indies Federation. It lies in the Caribbean Sea, about ninety miles south of Cuba and west of Haiti. It has an area of 4,411 square miles and a population of over a million and a half. Kingston is the capital and chief seaport. Population, about 171,600.

Along the coast the climate is hot and sultry, but the temperature becomes delightfully cool as one climbs the sloping interior to the Blue Mountains, with an elevation of over 7,000 feet. The rich, green foliage and snow-white roads contrast with the blue of the sea to create a vision of tropical beauty. Agriculture is the chief industry, the leading crops being sugar cane, coconuts, cacao beans, bananas, coffee, tobacco, and corn. Many industries have moved to Jamaica because of the low tax rate.

The governor of Jamaica is aided by an elected House of Representatives and a two-house Legislative Council. In 1958 Jamaica joined nine other colonies in the West Indies to form an independent federation within the British Commonwealth (see BRITISH WEST INDIES). Turks Island, Caicos Islands, and the Cayman

GINNING COTTON IN JAMAICA
Almost half the people of Jamaica are farmers. Plants of great variety grow on this tropical island, including 194 varieties of orchids. This woman gins cotton by hand.
Allan Gould

From one of a series of oil paintings, "A History of Pharmacy in Pictures," commissioned by and copyrighted by Parke, Davis & Co.; reproduced by special permission. George A. Bender, project director; Robert A. Thom, artist.

JAMES I REIGNED IN A PERIOD OF CHANGE
He is shown granting charter which freed apothecaries from control of grocers' guild.

Islands are under the same rule.

Discovered by Columbus in 1494, Jamaica was first settled in 1509 by the Spaniards. In 1655 the island was taken by the British, and fifteen years later, it became a formal British possession under the Treaty of Madrid. Slaves were imported in the 1700's to replace the Indians killed by the Spaniards. Revolts were frequent until slavery was abolished in 1833. Jamaica has become a popular tourist attraction in the Caribbean.

JAMES I (1566-1625). The son of Mary, Queen of Scots, and her second husband, Lord Darnley, became James VI of Scotland upon the abdication of his mother in 1567, when he was only a year old. His reign was disturbed by factions among the nobles. One group imprisoned him in Ruthven Castle in 1582, but another group soon released him. Princess Anne of Denmark became his wife in 1589. Upon the death of Queen Elizabeth in 1603, he was crowned as James I, king of England, as a descendant of Henry VII.

During his reign occurred the notorious but unsuccessful Gunpowder Plot (see GUNPOWDER PLOT). Attempts to unite Scotland with England failed, though Scotsmen born after James was made king of England were declared English subjects. On failing to marry his son Charles to a Spanish princess, he declared war against Spain, and died shortly after entering upon this struggle. An authorized version of the Bible, the King James version, was completed during his reign. James was succeeded by Charles I.

JAMES II (1633-1701), second son of Charles I, succeeded his elder brother Charles II as king of England in 1685. Several unsuccessful attempts were made to keep him off the throne because of his Catholic sympathies. He put down a rebellion under the Duke of Monmouth and continued an alliance with Louis XIV, who paid him to assist Catholics and oppose the Dutch Protestants.

In the bloodless revolution of 1688, William of Orange was offered the English throne, and James fled to France. He was received by Louis XIV, who helped him try to regain Ireland in 1689. Defeated in the Battle of the Boyne in 1690, James failed in all further attempts to return to power. William and Mary (daughter of James) were crowned rulers of England in 1689.

JAMES, SAINT, called THE GREATER. The patron saint of Spain, Saint James was one of Christ's apostles. According to the Bible, he and his brother John saw the transfiguration of Christ on the mountain and the Lord's ascension. He was the first apostle to be martyred, being put to death about A.D. 42 by order of Herod Agrippa I.

JAMES, SAINT, called THE LESS, was the reputed author of the Book of James in the Bible and is said to have been the first Bishop of Jerusalem. His influence in spreading the Christian faith alarmed the Jews. He was killed by Ananias, the high priest of the Hebrews, A.D. 62.

JAMESTOWN, VA., was the first permanent English settlement in America. It was founded in 1607 by a small expedition commanded by Christopher Newport. Under the auspices of the London Company, this little party sailed up the James River and settled about thirty-two miles from the river's mouth on a low, swampy peninsula. Many settlers died during the first few months, but by 1612, newcomers had started a prosperous tobacco industry.

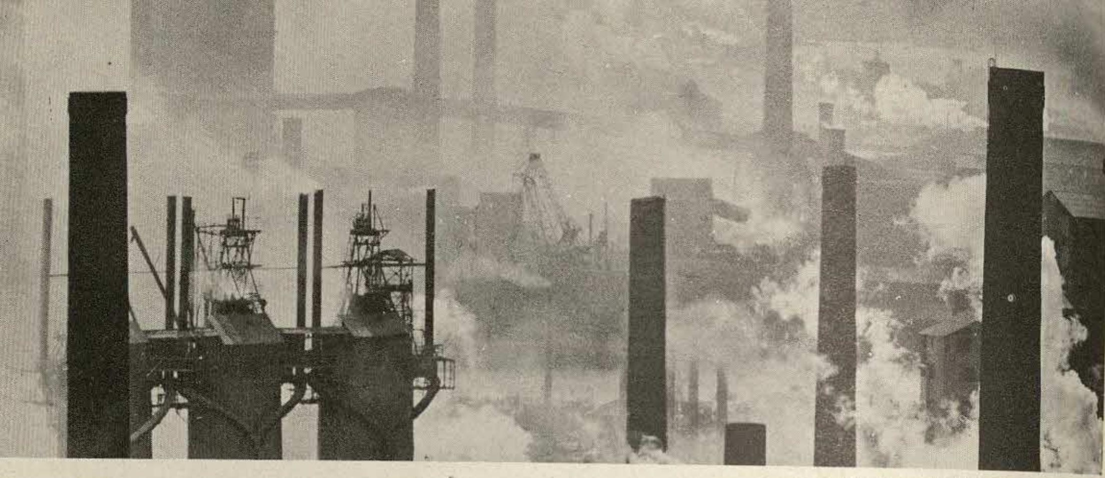
Here in 1619 was established the House of Burgesses, the first legislative assembly in America; the same year saw slavery first introduced into the colonies. During Bacon's Rebellion in 1676, Jamestown was almost completely destroyed by fire; but the colonists courageously rebuilt their city and it remained the capital of the colony until 1699, when Williamsburg became the seat of government. The town rapidly declined after the removal of the capital.

Jamestown Island, the former peninsular site of Jamestown, has been made a national monument, together with Williamsburg and Yorktown. Still to be seen in the quaint old place are ruins of an old fort and of the church built on the site of the one destroyed in 1676, the old cemetery, and the remnants of two or three houses. In 1907, near this site, was held the Jamestown Tercentennial Exposition, commemorating the founding of the town.

JAN'UARY. The name of this month, which is a winter month throughout the Northern Hemisphere, dates back to the days of the Roman king, Numa Pompilius. It was named for Janus, the god of doors and gates (see JANUS).

Originally the year had but ten months, beginning with March. Numa changed the calendar, adding January with thirty days. In Julius Caesar's reign, the calendar was again changed, making January the first month and giving it an extra day. Anglo-Saxons called January the "Month of Wolves." The month, particularly New Year's Day, is accepted as the time for taking stock of the mistakes of the past and making resolutions for the future.

JA'NUS. The guardian of doors and gates, Janus, an ancient Roman god, was represented as having two faces, one looking forward and the other backward. The first month of the year was named for him, and his aid was always asked before any important undertaking. The gates of the temple of Janus in Rome were kept open during war and closed during peace. For many centuries, January 9 was celebrated in his honor.



Consulate General of Japan

Japan—From Feudal Kingdom to Industrial Empire

JAPAN, *ja pan'*. The "Land of the Rising Sun" is a country of mountainous islands lying in the North Pacific Ocean to the east of continental Asia. This is the land of Fujiyama (snow-capped volcano), the cherry blossoms, and the rice fields. More important, however, is the fact that after centuries of isolation Japan rose from an obscure position to one of world power, only to become, in 1945, a defeated nation occupied by her conquerors.

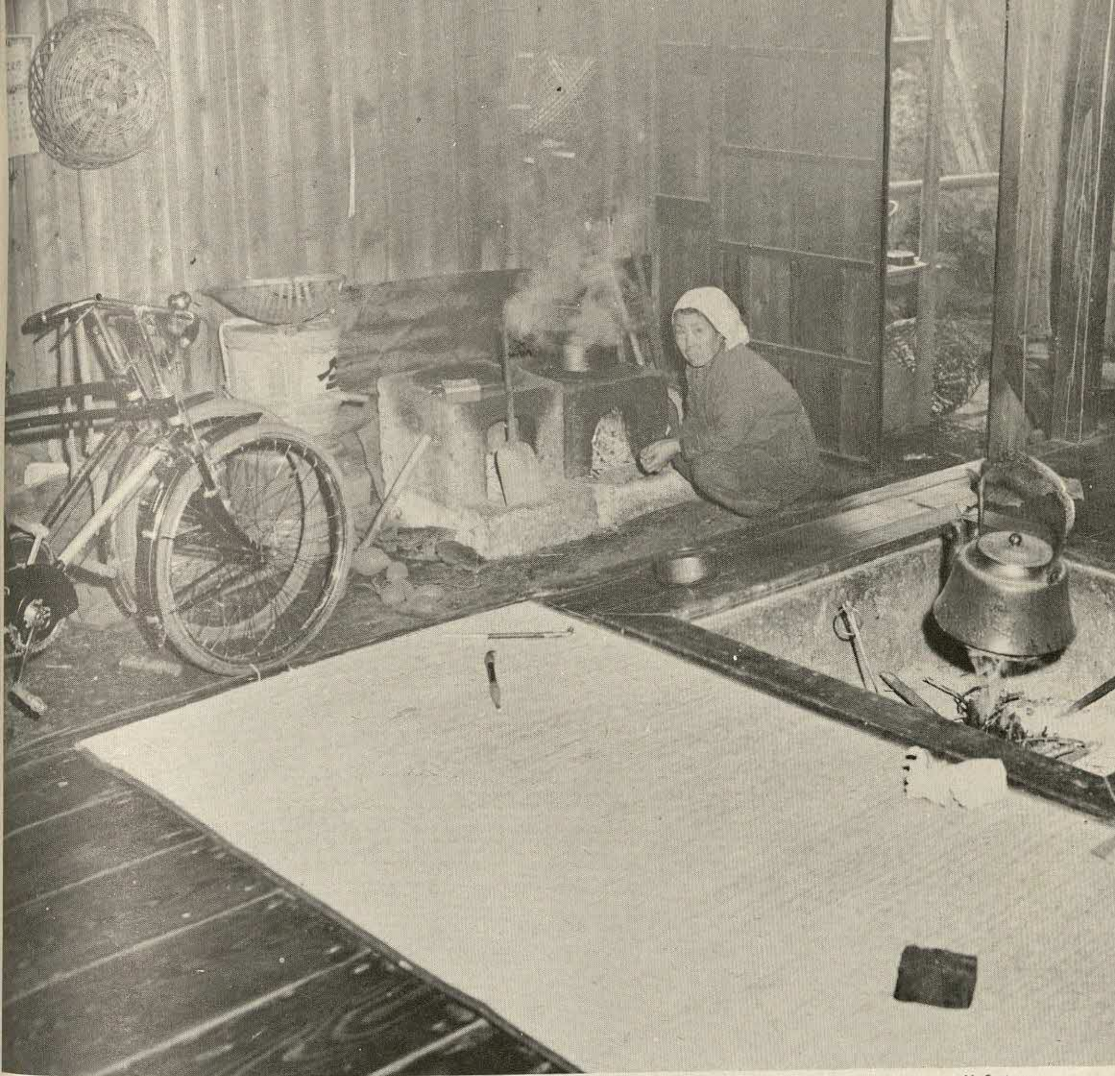
Once Japan was devoted mainly to the development of beautiful manners and customs, art, and poetry. But in less than a century she became a highly industrialized nation with many factories, modern cities, and a large army and navy. Many of the people discarded their picturesque kimonos and adopted the clothes and customs of the Western World. Instead of living apart from other peoples, content with their island home, the Japanese turned to the development of a world empire.

Before World War II, the Japanese Empire consisted of a long chain of nearly 4,000 islands, of which only about 500 were inhabited; it included also Formosa, Korea (Chosen), the southern half of Sakhalin, Manchukuo (Manchuria), and mandated islands, and had an area of about 263,000 square miles and a population of over 103,000,000. Japan's surrender in 1945 left her only the home islands of Hokkaido (Yezo), Honshu (the largest), Shikoku, Kyushu, and adjacent smaller islands; these, which together constitute Japan proper, have an area of 142,644 square miles and a population of about 92,000,000. Tokyo, the capital, is on Honshu.

The Land and Its Waters. Japan is a country of mountains and valleys, extensive forests, and many rivers and lakes. On the four principal islands is a range of high mountains running from southwest to northeast. These main ranges are crossed by north-south ranges. The island of Honshu is dominated by the symmetrical extinct volcano, Fujiyama, which has come to be one of the most noted features of Japan. Between the mountain ranges are deep valleys that slope down to the level land along the coast.

These islands are so small and so ridged with mountains that rivers have little opportunity to develop into large streams before they reach the sea. The Ishikari is the longest river, flowing for 275 miles across Hokkaido. Because of the surface features, Japan's rivers are very rapid and are navigable for only short distances.

Climate. Because Japan extends for such a great distance, the climate differs in various parts of the empire. In the north the winters are cold with a great deal of snow, but in the south the climate is almost tropical. Even on some of the individual islands



U. S. Army

Japanese Home Life is Simple and Refined

The Japanese people have adopted many Western ideas and inventions but they also retain many customs that have been part of their society for centuries. Most Japanese farm houses are small one-story structures with one or two rooms divided by sliding screens. The screens may be removed to transform a series of rooms into one. There are few pieces of furniture. Straw mats scattered on the floor take the place of chairs. The view above shows the combination kitchen and dining room of a typical farmhouse. In the background are the wood-burning stoves at which the family's meals are prepared. The farm kitchen usually has a dirt or stone floor, and is one level below the dining area. Before walking from the kitchen to the mats used for dining, family members and their guests customarily remove their shoes.

there is a great variation because there are high and low regions close together. In most parts the rainfall is heavy, but it is not well distributed throughout the year so that sometimes irrigation is necessary.

Products of the Land. Farming is the leading occupation of the land, although only 16 per cent of the land is cultivated. Farms are small and the soil has to be heavily fertilized. Rice, the biggest crop, occupies 55 per cent of the farmland, but this is not enough to supply the needs and large quantities have to be imported. Other important products are wheat, barley, rye, corn, soybeans, fruits, tea, cotton, hemp, and sugar cane. Livestock has become important and milk and milk products are used extensively. The chief silk region is west of Tokyo.

Fisheries. Fish is the most important food, next to rice, for the Japanese. Many kinds of fish are found in the coastal waters of the islands and in the inland streams. Although fish is plentiful, the government maintains many hatcheries for fish culture.

Natural Resources. Copper and coal form the major mineral resources in Japan. There are some deposits of iron, but Japan imports large quantities from the United States and Europe. Forests, which cover two thirds of the land area, are among the most important natural resources.

Industries. Japanese factories have become increasingly important with the introduction of Western methods. The workers excel in the manufacture of electronic equipment, textiles, and electrical appliances. Paper, glass, brick, chemicals, lacquer ware, and matches are also manufactured. Shipbuilding accounts for a good part of the total world output. In addition, the Japanese are noted for their handwork in ivory, wood, bone, and shell.

Commerce and Communication. Since World War II, Japan has struggled to revive her foreign trade, because she still has to import nearly all her raw materials and food. To balance her trade, Japan must have heavy exports.

Japan depends on railways for much of its transportation. There are about 17,000 miles of railways, mostly owned by the government. Airlines link the country to the rest of the world, and ocean cables, telegraph, telephone, and radio connect all the islands and link Japan with other countries.

People and Religion. Little is known about the origin of the Japanese. Their language is of a Mongolian type, but the people are a mixture of various groups. Japanese are short of stature, with long bodies and comparatively short legs. Their heads are round, and their complexion is olive. They are good natured, intelligent, and extremely progressive in adapting to new ways.

The worship of Buddha was brought from China at an early time, and some of its ideas were mixed with Shintoism, the original religion of the people. The worship of Confucius was later introduced. Shintoism is the worship of the Sun Goddess, the traditional ancestor of the emperor. In recent times Christianity has spread rapidly, although Shintoism and Buddhism still have the greatest number of followers. The Japanese are free to worship as they please, and there is no state religion.

Language, Literature, and Art. The Japanese language is fundamentally Mongolian in origin, but other tongues such as the Tartar, Tungusic, and Manchurian have been combined with it. Although Chinese ideographs are used in writing, the language differs from the Chinese in that it has polysyllables. Japanese is an inflected language with an alphabet of forty-seven characters. It is very difficult to learn.

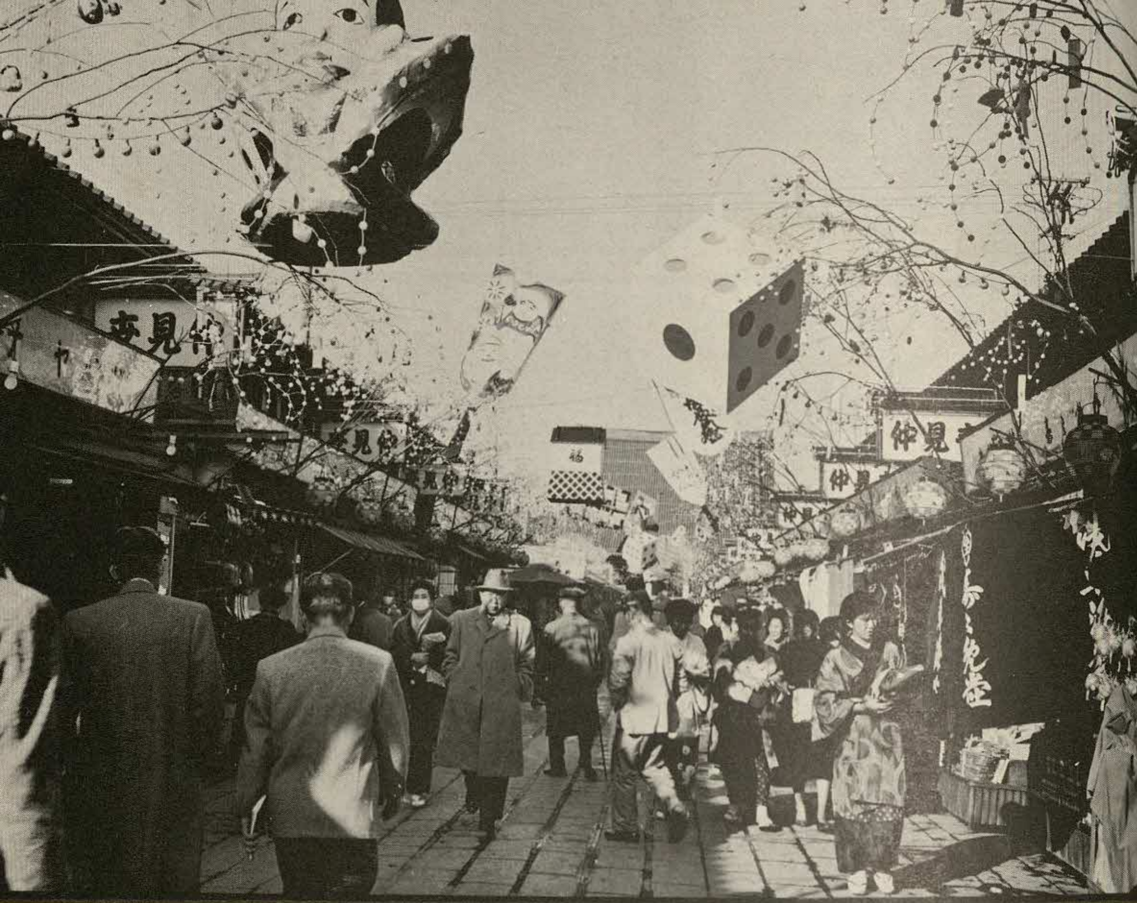
Chief literary forms are the novel, poetry, and drama which includes the *Kabuki* and the *Noh*. The first literature of Japan was produced in about the sixth century and dealt chiefly with religious subjects. As the country came in contact with Western civilization, the literature came to be written in modern forms and to deal with modern knowledge and ideas.

Color Photo from Hostess School of Japan Air Lines

The Grace of Old Days and Old Ways is Not Forgotten

Modern Japanese girls still learn the centuries-old ritual of *cha-no-yu*, the tea ceremonial. Every step of this simple ceremony is done with classic elegance, and it takes long, patient practice to become skilled in this graceful art. Everything from boiling water to the arrangement of the cups is done in a precise way to give ritual meaning to tea drinking.

Girls of Japan also learn the latest arts and skills along with the old customs. They go to school, many learn English, and some go on to college. Their abilities range from building transistors to serving as gracious airline hostesses. They can do many things well because their training in cha-no-yu has given them dexterity, patience, and charm.



HAPPY NEW YEAR—TOKYO STYLE

Souvenir shops and stalls, above, blossom out in holiday decorations in Asakusa, a popular amusement center in Tokyo. The Japanese also decorate their homes to celebrate the New Year.

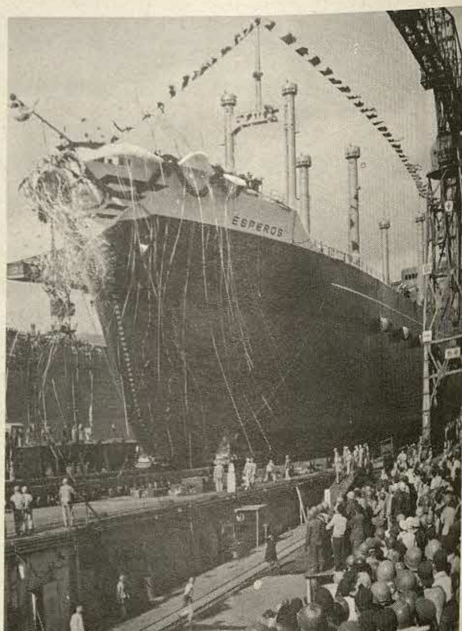
NEW STYLES IN LIVING

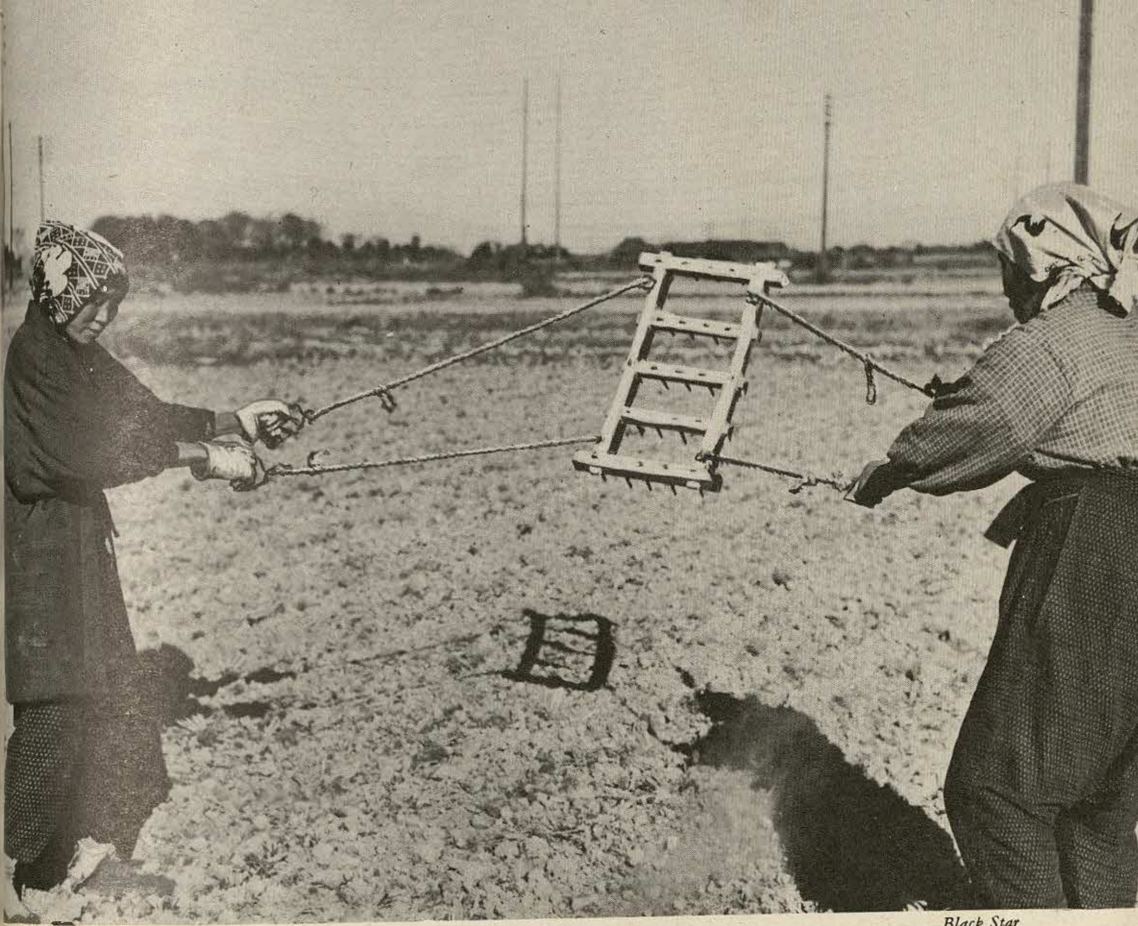
Apartments like these at left help Japan's housing shortage—a striking contrast to old-style wooden houses.

ANOTHER SHIP GOES TO SEA

Japan is one of the world's major shipbuilders. Right, a colorful launching at the dockyard in Kobe.

Consulate General of Japan





Black Star

BREAKING THE SOIL IN JAPAN

Women farmers swing a nail-toothed hand harrow to break up the ground for planting seeds.

The Japanese are a highly artistic people, and their art forms have a wide range, including fine mosaics, lacquer and pottery, embroidered silk, carving in ivory and wood, and paintings of remarkable clarity. Almost every Japanese home contains paintings, hanging either on the walls or on sliding panels. Painted screens are often used to decorate the home. Fans are decorated with drawings. Colorful scrolls unwind to tell a story in pictures. Japanese art uses color and line instead of shadow and perspective, and this idea of space has influenced many contemporary Western painters, particularly the Impressionists.

Japanese Customs. Unlike the customs of other countries, many of which have been borrowed, those of Japan are centuries old and can be found in no other part of the world. A visit to a Japanese home will reveal at once just how different these customs are from those of America and Europe. The houses of Japan are attractive, comfortable, and inexpensive, being usually made of wood or bamboo with thatched roofs. Instead of permanent walls to form the rooms, there are sliding screens that are put in place at night and removed in the morning. Thus in the daytime a Japanese house is one large room.

Upon entering a house, visitors take off their shoes and leave them outside. The interiors of the houses are simply furnished, for there are no chairs; instead, the people sit on cushions and straw mats. When meals are served, the people kneel at low tables and eat with chopsticks. Japanese beds are made on the floor, with little wooden blocks to serve as pillows.

No Japanese house is complete without a

garden. Japanese gardens are famous for their beautiful flowers and artistic arrangement. The gardens are made to look like natural landscape, with tiny mountains and little hills and brooks. Flowers mean much to the Japanese, and each season has its special blossom, which, when it achieves its height of beauty, is a signal for holidays. The most important holidays come in the spring when the cherry trees bloom.

Although many people wear Western clothes, the old Japanese dress is still preferred in the home. The chief garment is the kimono, with long, full sleeves. It is held in place by a heavy silk sash. Boys and girls dress much like their parents, but the girls wear brighter colors. Kimonos have no pockets, but in the wide sleeves many things can be carried.

Government and Education. The Constitution of 1889 recognized that sovereignty was vested in the emperor, who with a cabinet of ministers was the executive department. The emperor or the Son of Heaven, as a descendant of the Sun Goddess, passed on all laws, supervised all administration of government, appointed and dismissed all government officials, and headed the army and navy.

Fostered by the occupation, democracy sprang up in Japan almost overnight. The first step came in a New Year's broadcast (1946) when the emperor denied his own divinity. Today he is honored as a symbol of the unity and dignity of the people, parallel to the royal position in Great Britain.

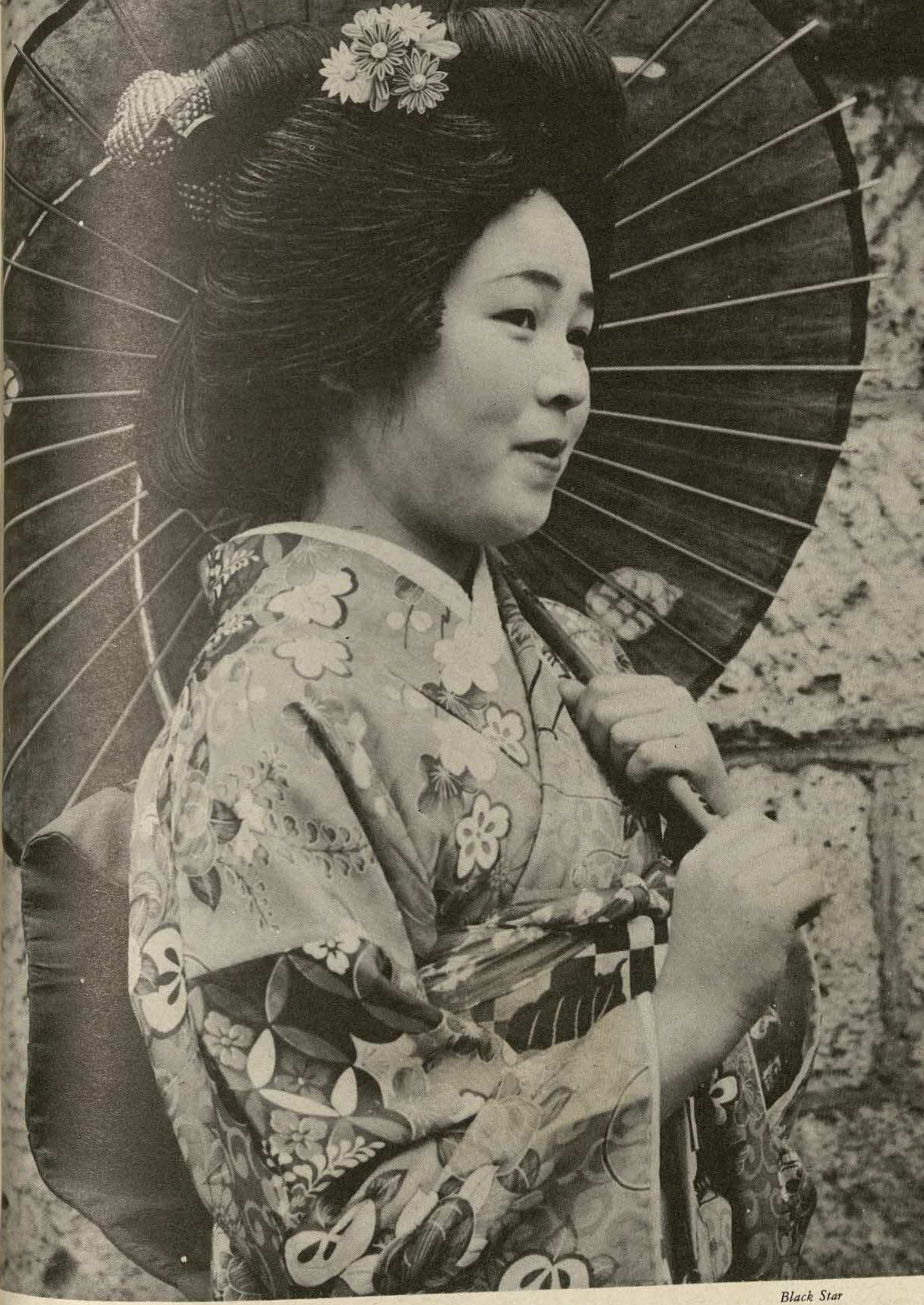
The Constitution of 1947 proclaimed the sovereignty of the people entrusted to the elected House of Representatives (467 members) and a House of Councillors (250 members). The prime minister, chosen by the Diet from its own ranks, and his cabinet hold the executive power. The prime minister must be a civilian.

The Japanese government was westernized on many levels. The new constitution denounced war, abolished the peerage, lowered the voting age for men from twenty-five to twenty, granted suffrage to women, guaranteed the separation of church and state, and included a Bill of Rights insuring freedom of speech.

Fuji Broods Over Sightseers

By Burton Holmes from Ewing Galloway

This boatload on Lake Shoji is typical of the many Japanese who visit this ancient volcano. Fujiyama is named from the Ainu word meaning *fire*, but it has not erupted since 1649.



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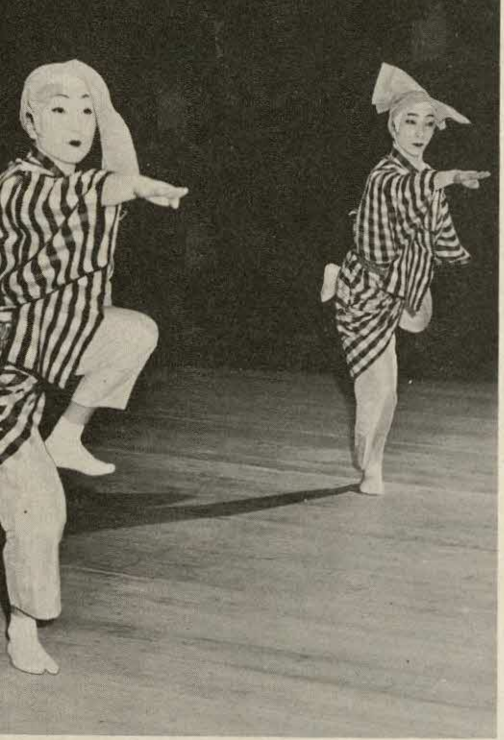
IN CEREMONIAL DRESS

This kimono and headdress are worn only for ceremonial occasions. Many Japanese in the large cities have adopted Western-style dress for everyday wear.



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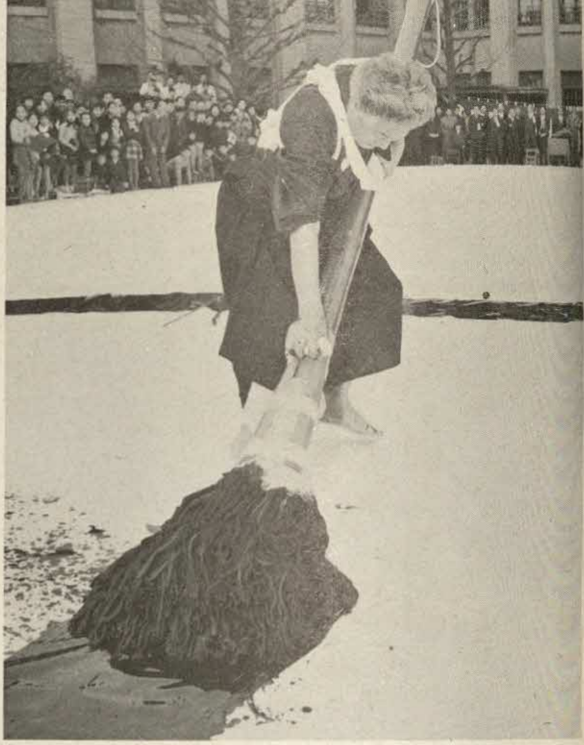

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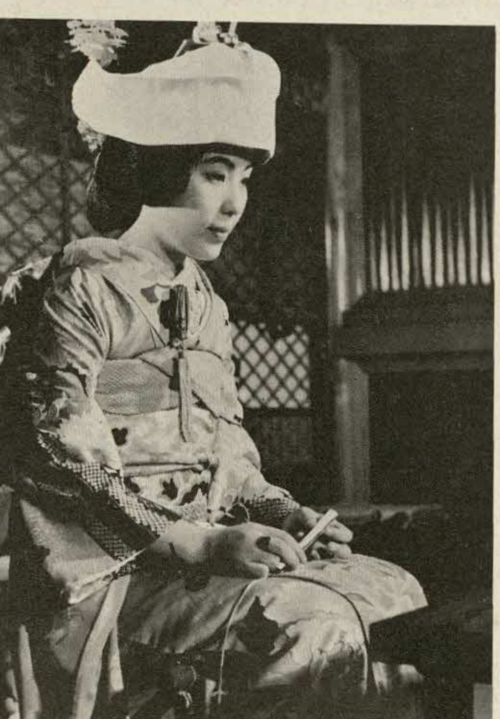
A comic pantomime in a Japanese folk dance. The dancers represent two peasants "enjoying life."

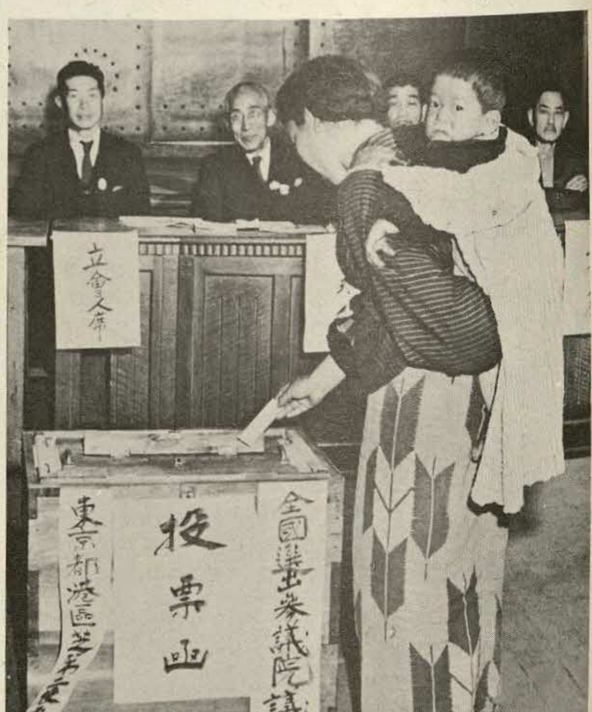
A bridal gown for the Japanese bride includes a curious headdress to curb the "horns of jealousy."

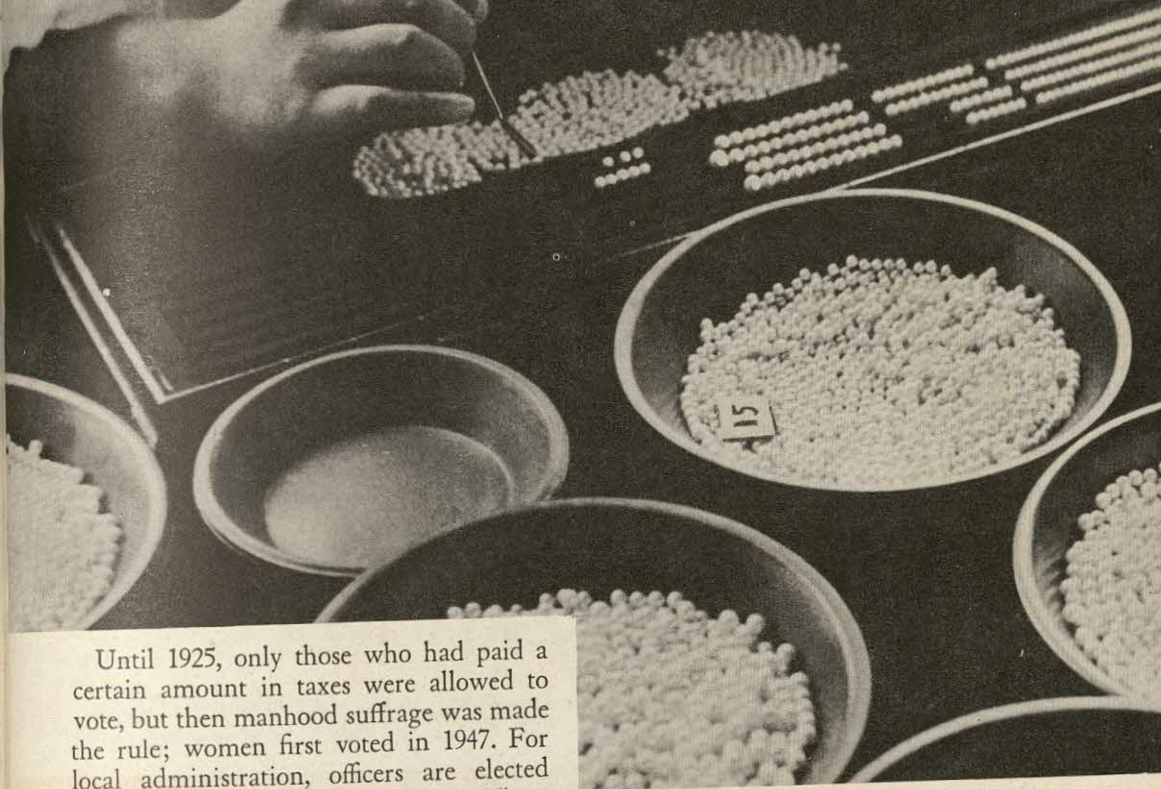
Writing on a giant scale. This master calligrapher who wields a 120-pound brush also writes on grains of rice.

The right to vote is precious to Japanese women. This mother even carries her baby piggyback to the polls.

UPI







Black Star

MATCHING A FORTUNE IN PEARLS

Women dive for pearls off the coast of Japan. Here the pearls are separated for size. Later they will be graded and strung into necklaces for women in many parts of the world.

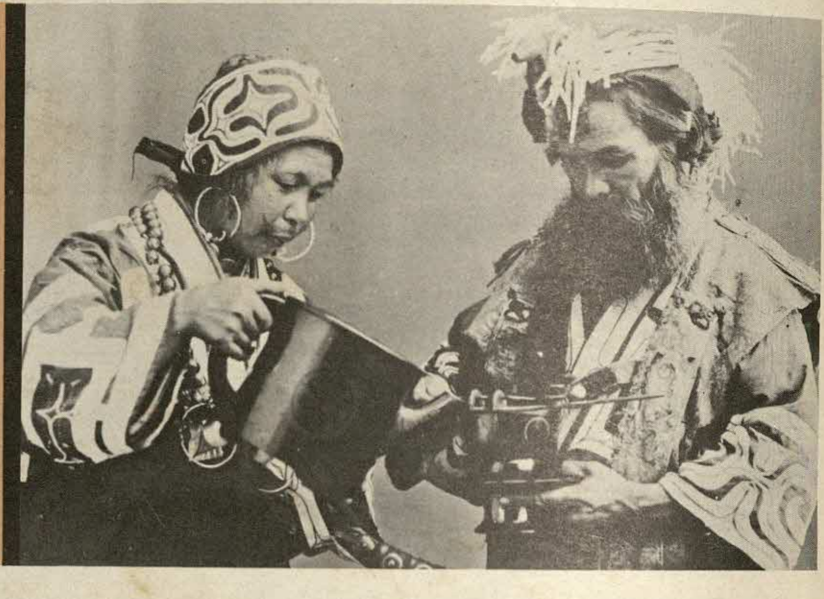
Until 1925, only those who had paid a certain amount in taxes were allowed to vote, but then manhood suffrage was made the rule; women first voted in 1947. For local administration, officers are elected from prefectures and urban districts. There are forty-six prefectures; in each are a governor and an assembly, elected by popular vote.

Today in Japan elementary education is free and compulsory. The educational system, which includes the kindergarten and elementary, middle, and high schools, as well as the universities, is controlled by the government. There are 227 colleges and universities. Leading ones are: Tokyo, Fukuoka, Kyoto, Sendai, Sapporo, and Osaka.

History. According to the Japanese, the first emperor of Japan was Jimmu Tenno, who began his rule in 660 B. C. He was the first of a dynasty supposed to be the longest unbroken line in history, of which the present emperor is a member. The known history of Japan begins in the sixth century A. D., with the introduction of Buddhism, which soon became the established form of worship. By the beginning of the seventh century, the power of Japan had rapidly developed, and the people began to venture into the mainland of Asia. For the next 500 years the people made great progress toward civilization. They were united under well-organized central government, which was headed by the powerful Fujiwara family.

In a series of wars this family was driven from the throne in the twelfth century, and Japan came to be ruled by war lords, called *shoguns*. For the following 400 years, the country was rent by internal strife. The military class became powerful enough to be independent of the emperor. So bad did the situation become that at one time in the fourteenth century there were two rulers. The shoguns lost their power for a time, but later became firmly established again. In 1600 Iyeyasu, a great general and statesman, founded a powerful ruling class of shoguns that remained in control until 1867.

The first European traders and missionaries began to arrive in the sixteenth century. At first the strangers were welcomed;



AINU BEAR CEREMONY

The bear is considered a god in the primitive religion of the aboriginal Ainus of Japan. Dressed in full ceremonial robes, two tribal leaders drink in his honor. The libation stick above the cup holds the chief's mustache out of the wine—but not the woman's. Her mustache is tattooed.

Three Lions

but when they tried to interfere with Japanese customs and beliefs, the rulers became alarmed and decreed that no more Europeans could enter the country. For more than 200 years there were no relations between Japan and any European nation. However, no country as great as Japan could remain apart from the world forever, and in 1853 Commodore Perry forced the Japanese to open their country to the whole world. Treaties were made with the United States and other nations, and Japan began to build up a great world commerce.

As the Japanese traveled throughout the world, they awakened to their country's need of new ideas and new inventions. The government of the shoguns was overthrown in 1867, and in 1889 constitutional government was adopted. Western innovations made Japan a modern nation.

The Japanese began a career of expansion in 1894, when they fought with China over their conflicting interests in Korea (Chosen). In 1904 Japan engaged in war with Russia. As a result of Japanese victories, Korea, the island of Formosa, the Liaotung peninsula, and half the island of Sakhalin became a part of the empire. Japan rendered great service to the Allied cause in World War I by checking German activities in the Pacific, and was rewarded with the mandate over Germany's North Pacific islands.

Over-population, the need of more markets for manufactured goods, and lack of raw materials led Japan upon a broad path of conquest in the period after the First World War. In 1931, on the pretext that the Chinese were not protecting Japanese interests in the Manchurian railway, Japan invaded Manchuria, and later governed it as the state of Manchukuo. In 1933, Japan withdrew from the League of Nations.

Increasing demands on China culminated in an undeclared war in July, 1937, that in the next eight years brought as much as eleven per cent of the total area of China and its dependencies under her control. In March, 1940, she set up a puppet government at Nanking.

Japan concluded a military alliance with the Axis in September, 1940. On December 7, 1941, Japanese bombers attacked the American naval base at Pearl Harbor and almost at once the United States and the other Allies declared war on Japan.

After the atom bombing of Nagasaki and Hiroshima, Japan surrendered on September 2, 1945. In 1951, the peace treaty was signed. The nation regained her sovereignty in 1952.

Japan's postwar recovery was rapid. Industries were built up and markets were regained. The population increase was slowed somewhat but still was about a million a year, very great for the small land area. However, Japan's standard of living was the highest of any country in Asia.

Consult also the following articles:

Boxer Rebellion
China
Chinese-Japanese Wars
Chosen
Formosa
Kuril Islands
Kuroshio
Manchuria
Osaka
Russo-Japanese War
Sakhalin
Tokyo
World War (I, II)
Yokohama

JAPAN CURRENT. See Kuroshio.

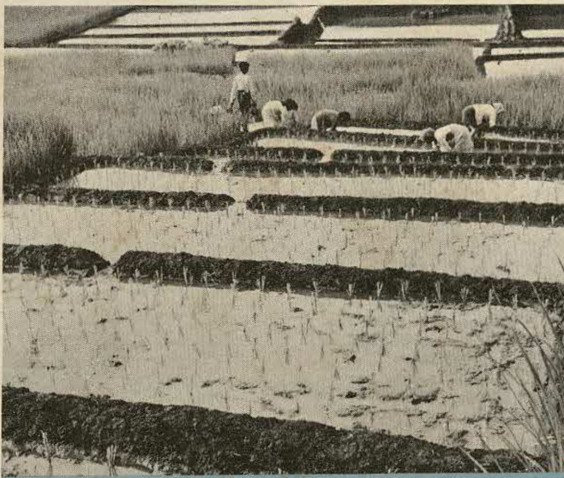
JASMINE, *jas′min,* **or JESSAMINE,** *jes′ a min.* Hardy shrubs well known in the South, the various species of jasmine belong to the olive family and are believed to have originated in the warmer parts of Persia.

They are climbing or erect plants, growing from six to ten feet high. In many cases they bear flowers of a delightful fragrance. The white blossoms of one jasmine grown in Southern states are used in making a valued perfume, oil of jasmine. Other varieties bear yellow flowers, as the Italian species. *Cape jasmine* is one of the gardenias and is not a true jasmine (see Gardenia). And the common yellow jasmine of the South is an evergreen vine, also of a different genus from the true jasmine.

JA′SON. The search of Jason and the Argonauts for the Golden Fleece is a familiar Greek legend. Jason's kingdom of Iolcus in Thessaly had been usurped by Pelias, his uncle, who promised its return if Jason could secure the fleece. Sailing to Colchis in the *Argo,* Jason overcame great odds with the aid of the magic of Medea, the daughter of the king, and returned with the prize. Pelias was killed and Jason and Medea began their rule. They soon lost their power, however, and were forced to flee to Corinth. See Argonauts.

JAS′PER. An opaque form of quartz, jasper is used for small ornaments and inexpensive jewelry. It is so common in nature that the price of a jasper article depends on the labor of cutting and polishing, rather than on the value of the material.

Jasper is usually red because of the hematite iron ore it contains. It may also be yellow, dark green, and grayish blue. The rock in which the Lake Superior iron ores occur is called jasper because it contains some beautifully red-banded deposits of this material.



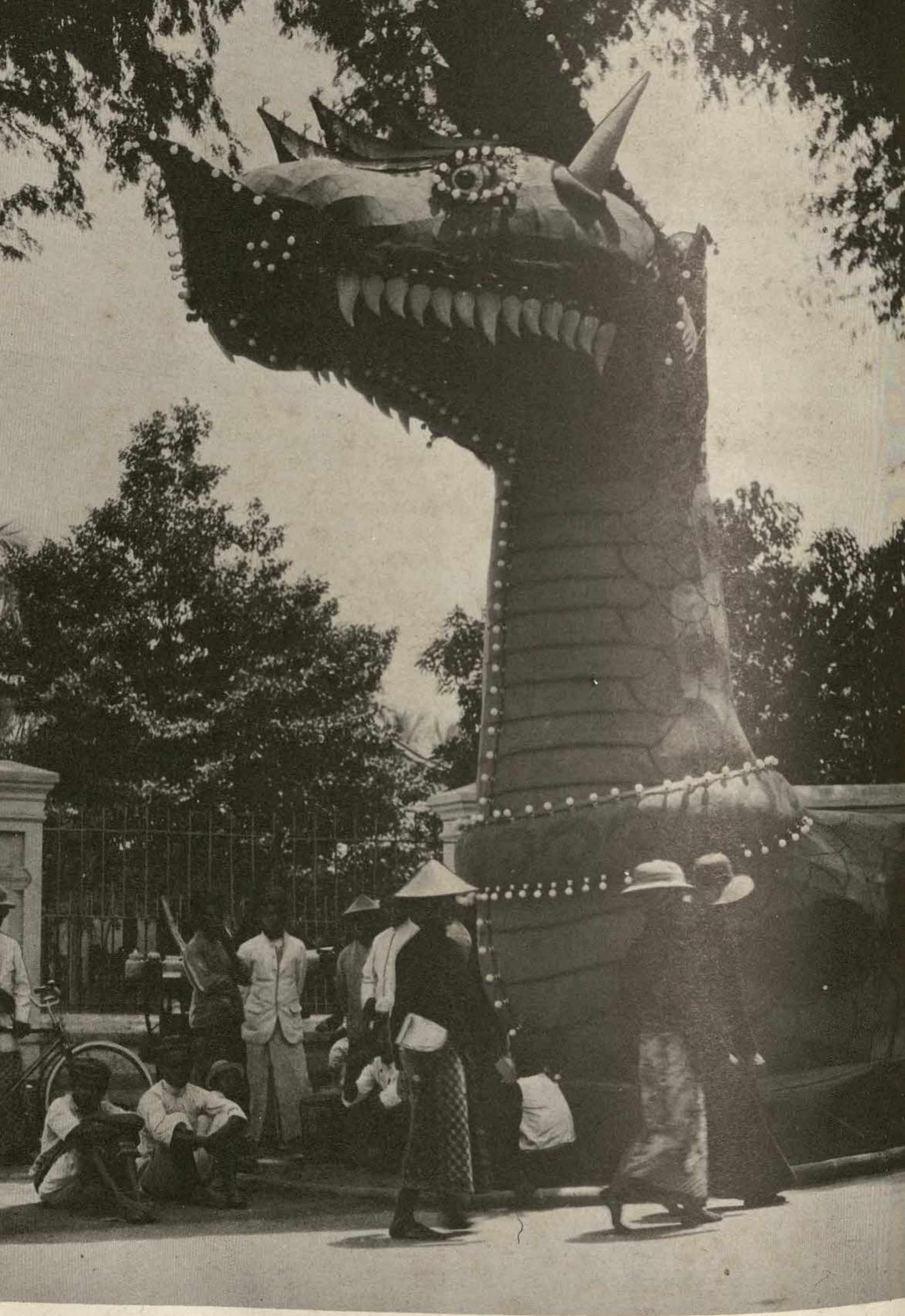
Standard Oil Co. of New Jersey

NO PLACE FOR NEW SHOES

Java farm workers splash barefoot through rice paddies to transplant the year's crop.

JAVA, *jah′vah.* One of the richest and most productive islands in the world is Java, the largest island in the Republic of Indonesia (formerly the Dutch East Indies), lying in the Indian Ocean, just south of Borneo. Its wide, fertile plains and forested mountains, with their tropical vegetation, attract many tourists. The island is 666 miles in length from east to west, and from 45 to 120 miles wide; it has an area of about 49,000 square miles. Java and the near-by island of Madura formed one administrative unit under Dutch rule.

Java is of volcanic origin and a chain of mountains extends throughout its length. In the fertile valleys and along the coastal plains, farming is the chief occupation.



Ewing Galloway

THE RESPLENDENT DRAGON

A Javanese sultan had this dragon built to impress visiting royalty. It is 700 feet long and is covered with electric lights.

Much of the land is held by the government, and is divided up into native farms and large plantations. Rice is the chief food crop of the people. Other native crops include maize, potatoes, peanuts, and soybeans. The plantations raise crops chiefly for export, among them being sugar cane, tea, coffee, rubber, tobacco, cacao beans, indigo, cinchona, spices and fruits. Fishing, tin-mining, and raising livestock are leading occupations. Indonesia is an important petroleum producer.

The People of Java. The inhabitants of Java are divided into a number of groups, which include the Javanese, the Baduwis, the Sundanese, and the Tenggerese. All of these people, however, are of Malay origin. Java is one of the most densely populated regions in the world, with a population of about 52,000,000, or more than 1,000 to the square mile.

Jakarta (formerly Batavia), the largest city of Java, is the capital of the Republic; it and Soerabaja are the important seaports. Before 1942, Java was under the control of governors appointed by the Netherlands government, and the native states had a high degree of self-government. Java was occupied by the Japanese early in 1942. When Dutch sovereignty was restored in 1945, the Indonesians launched a campaign for independence. In 1949 Indonesia became a republic and in 1950 became a member of the United Nations. See INDONESIA.

JAY. It is unfortunate that such handsome, dashing birds as the jays have so evil a reputation for robbing the nests of song birds, stealing grain and fruit, and being generally noisy and mischievous. They seem to have all the bad habits of the crow family to which they belong.

The most common species in North America is the *blue* jay, a big, noisy fellow with bright-blue plumage trimmed in black and white. The blue jay is found, in the East, from Canada to the Gulf of Mexico. There is a slight southward movement in winter. Like most other jays, it is somewhat larger than a robin and has a long tail. In a nest of twigs and rootlets it lays three to six eggs, greenish or buff in color, with brown spots.

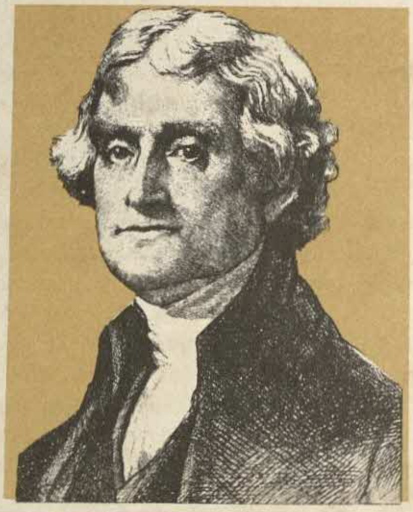
JAY, JOHN (1745-1829). One of the most famous of early American statesmen and jurists was John Jay, noted for his work in behalf of the Federal Constitution and for his preparation of a treaty between England and America. Jay was the author of some of the papers urging support of the Constitution, collected under the title *The Federalist.*

Born in New York City, Jay was educated at King's College (now Columbia University), graduating in 1764. Having studied law in a private office, he was admitted to the bar four years later. A delegate to both the First and Second Continental Congresses, Jay was elected to the New York legislature in 1776. He again returned to Congress in 1778, and the next year accepted a post as minister to Spain. While still in Europe, he was invited to Paris to assist Franklin in obtaining French aid for the Revolution, and again in 1783 to aid John Adams and Franklin in the negotiation of the treaty of peace with England.

Shortly afterward, Jay returned to the United States, where he became Secretary of Foreign Affairs until the Constitution went into effect. Under Washington's administration, he became the first Chief Justice of the United States Supreme Court. In 1794, as a special envoy, he went to England and negotiated the treaty bearing his name. The following year he resigned his post as Chief Justice and became governor of New York, retiring to private life in 1801. Among his contemporaries he holds a leading place.

JAY TREATY. Signed in 1794 between Great Britain and the United States, the Jay Treaty attempted to remove the causes that eventually led to the War of 1812. This agreement, which was negotiated by Chief Justice John Jay and Lord Grenville, provided for a commission to fix the boundary between Northeastern United States and Canada, and for the surrender of the British forts in the Northwest Territory. It further provided that the United States should pay its pre-Revolutionary debts to English merchants, in return for which England was to pay for all illegal captures of American merchant vessels after the Revolution.

The people objected vigorously because the treaty made no reference to the kidnaping of Negroes by the British army or the impressment of American seamen by the British navy. Furthermore, it restricted United States trade with the West Indies. After a long struggle, the document was ratified, in spite of the fact that Jay and even Washington were charged with bribery. By no means a perfect treaty, it averted for a time a possible war with England, a war which the United States was in no position to undertake at the time. History has vindicated John Jay. See War of 1812.



THOMAS JEFFERSON
Third President of the United States
Administration: 1801-1809
First of the Democratic-Republicans (now Democrats). Jefferson believed in popular government; taught a doctrine that is still the democratic model.

JEFFERSON, Thomas (1743-1826). No man has exerted a greater influence in molding the spirit of American government than has Thomas Jefferson, author of the Declaration of Independence, and third President of the United States. The closing lines of his inaugural address, March 4, 1801, phrase a principle which has been a distinguishing feature of this democracy. He said, ". . . though the will of the majority is in all cases to prevail, that will, to be rightful, must be reasonable; . . . the minority possess their equal rights, which equal laws must protect, and to violate which would be oppression."

Into the Declaration he wrote the words —"All men are created equal . . . governments are instituted among men, deriving their just powers from the consent of the governed." Strange, that such words as these should come from a man like Jefferson. A true aristocrat in mien, born and reared in an atmosphere of wealth, polished in appearance, eloquent in speech, he nevertheless championed the cause of equality and the right of every man to a voice in his government. An individualist at heart, he extended his philosophy to politics, strongly advocating a Federal form of government which would recognize the sovereignty of the several states.

Bitterly opposed to many of Jefferson's ideas was Alexander Hamilton, a great political figure of the same era. Both were aristocrats and men of wealth, but they were far apart in their thinking on government. Hamilton favored a strong central government controlled by a few, "well chosen and responsible." In fairness to both, it should be said that through the years the outer form of the government in its tendency to centralization has gradually leaned toward Hamilton's views, but that the principles of the rights of individuals in that government, in general, have followed the concept of Jeffersonian democracy.

Early Life. On the morning of April 13, 1743, Peter Jefferson, owner of a large estate at Shadwell, Va., and his wife, one of the Virginia Randolphs, welcomed into the world a son whom they christened Thomas. The boy was educated in the common schools, under private tutors, and at William and Mary College. After leaving college, he studied law and was admitted to the bar in 1767. Two years later, young Jefferson was elected to the lower house of the Virginia legislature. He became one of the leaders in favor of the Continental Congress and formulated the instructions to the delegates from Virginia to the meeting of that body.

In 1775 he became a delegate to the Continental Congress. On June 10, 1776, he was appointed chairman of the Committee of Patriots, which prepared the Declaration of Independence, formally adopted on July 4. Jefferson himself was responsible for the phrasing of that historic document.

The Statesman. In the fall of that same year, Jefferson left the Congress to devote his time to state politics. He drafted a new Virginia constitution, served in the legislature, and then as governor. Although he was appointed one of the commissioners to negotiate a peace treaty with Great Britain, in 1783, he did not sail because the negotiations were already nearing completion. He re-entered Congress in that year, however, preparing legislation for the establishment of the dollar and its parts as the coinage system and drafting a proposed ordinance for the government of the Northwest Territory, the basis of the later Ordinance of 1787.

In the following year, Jefferson went abroad to assist Franklin and Adams in the negotiation of commercial treaties, and remained in France as minister until 1789.

Returning to America in 1789, Jefferson was appointed Secretary of State in Washington's first Cabinet, where he clashed with his long-time political foe, Hamilton, who was Secretary of the Treasury. He retired from office that year. At the close of Washington's second term, Jefferson was an Anti-Federalist candidate for President, but was defeated by Adams of the Federalist party, and became Vice-President. In this post he was not popular and risked his career by openly opposing the Alien and Sedition Laws. Before the election of 1800, Jefferson organized his followers under the name Republicans. Later, the term Democratic-Republican was used for the party, and eventually, just the present name, Democratic.

The Third President. Jefferson defeated Aaron Burr in a bitterly fought campaign, ending in a tie which was decided by the House of Representatives. It was this unpleasant election that brought about a constitutional amendment providing for a Vice-Presidential nominee.

Jefferson was the first President to send a written message to Congress instead of appearing before it in person. He advocated measures to reduce the army, navy, and diplomatic appropriations, and in many other ways encouraged simplicity and economy. For the first time the navy of the new nation entered foreign waters, forcing the government of Tripoli to end the piracy carried on against American vessels in the Mediterranean Sea.

Probably the most noteworthy accomplishment of the administration of the third President was the purchase of the Louisiana Territory from France (1803). This purchase seemed to contradict Jefferson's theories of how the Constitution should be interpreted, but he calmed his conscience with the realization that the people supported the action and that it was for the common good.

In 1804 Jefferson was easily re-elected. His second term was mainly concerned with problems of neutrality involved in the war between France and England. He opposed Britain's insistence on searching American vessels for British seamen and contraband. Congress adopted the Embargo Act, prohibiting French and English vessels from entering American ports, as a retaliatory measure. When it was evident that this action did more harm than good, it was replaced by the Non-Intercourse Act of 1809.

Other events of importance during this period included the Lewis and Clark Expedition into the Northwest; the unsuccessful conspiracy of Aaron Burr to establish a separate confederacy of seceding states; the establishment of West Point Military Academy; and the abolition of the practice of importing slaves from Africa.

Last Days. Succeeded by Madison, his choice for the position, Jefferson retired to Monticello, his beautiful colonial home in Albemarle County, Va., which became a shrine for those seeking aid and advice in politics. In his last years he founded the University of Virginia, which became one of the finest schools in the Southern tradition. On July 4, 1826, the fiftieth anniversary of his great contribution to the cause of democracy, Jefferson passed away. It was the same day on which his friend and political colleague, John Adams, died.

Jefferson's epitaph, written by himself, is a simple but eloquent summary of his place in American history: "Here was buried Thomas Jefferson, Author of the Declaration of Independence, of the Statute of Virginia for Religious Freedom, and Father of the University of Virginia; because by these as testimonials that I have lived, I wish most to be remembered."

Consult the following articles for additional information:

Alien and Sedition Laws
Declaration of Independence
Genet, Edmond Charles
Hamilton, Alexander
Kentucky and Virginia Resolutions
Lewis and Clark Expedition
Louisiana Purchase

JEFFERSON CITY, Mo. Built along the banks of the Missouri River, Jefferson City, the capital of Missouri, lies within a few miles of the geographical center of the state. It is the home of Lincoln University, a college for Negroes.

Industrially, Jefferson City has the advantage of near-by coal and zinc fields, and it forms a natural market for the rich agricultural region in which it lies. The manufacture of farm implements, boots and shoes, bricks, flour, clothing, twine, and foundry products provides employment for thousands. The city lies but 125 miles west of Saint Louis and has excellent rail facilities. A municipal airport gives Jefferson City access to transcontinental air lines.

The town was settled about 1822 and incorporated in 1839, and its government is administered by a mayor and council. The population is about 26,500.

JEHO'VAH. Among the Old Testament Hebrews, Jehovah is the name used to refer to God. For example, it occurs frequently in the first five books of the Old Testament. The Jews held this name much in awe and avoided pronouncing it, substituting *Adonai,* meaning *the lord.* This custom still prevails.

JEL'LYFISH. Among the lower forms of animal life are the jellyfish, queer creatures that look like jelly-like umbrellas floating in the sea. They are not true fish, but belong, with fresh-water polyps, sea anemones, and corals, to the branch *Coelenterata.*

Jellyfish may vary in size from a few inches across the top to more than six feet, and some species have streamers dangling from the underside which may be over 100 feet long. These streamers are provided with stinging hairs with which the jellyfish make helpless the animals upon which they feed. All jellyfish feed upon animal life and all have well-developed appetites. Most jellyfish are eaten by other marine animals. The common jellyfish of the Atlantic coast of North America are about eight inches across and, though they capture small animals by stinging them, do not harm people who are bathing in the ocean.

JENGHIS, *jen'giz* **KHAN.** See GENGHIS KHAN.

JEREMI'AH (about 650-about 585 B. C.). One of the prophets of the Old Testament, Jeremiah, author of the books of *Lamentations* and *Jeremiah,* reproached the people of Judah for their sinfulness and warned of impending destruction. Beginning his prophecies in 626 B. C., he lived to see the sack of Jerusalem by Nebuchadnezzar in 586 B. C. Afterward Jeremiah was offered a refuge in Babylon by Nebuchadnezzar, but preferred to remain with his people in Judah, although they hated and persecuted him for his unpopular prophecies. After the assassination of the governor, at Mizpah, where he was living, he with others fled to Egypt, and little more is known of him.

JERICHO, *jer'i ko,* PALESTINE. The fall of Jericho, a town of ancient Judea, is one of the best-known of all Bible stories. The key to the possession of Canaan, the town was captured by Joshua and the Israelites with the aid of God, according to the Old Testament story. Located northeast of Jerusalem, near the Dead Sea, Jericho was completely razed by Joshua, who placed a curse on whosoever should rebuild it; nevertheless, it was later rebuilt, and became important as the home of Herod. During Roman times, Vespasian again destroyed the city, but it was rebuilt once more. The small modern village of Eriha is near the ancient site of Jericho. See BIBLE STORIES, page 373.

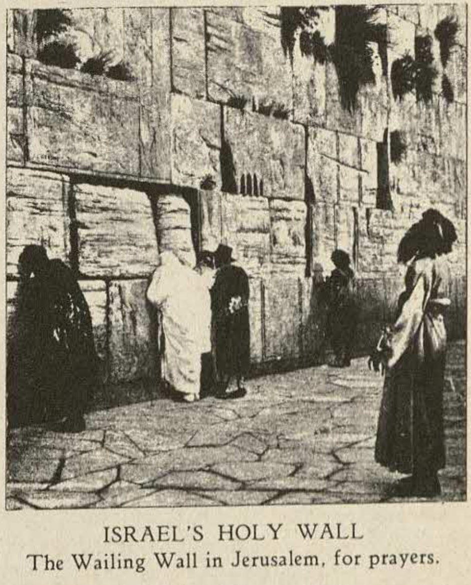
JERICHO ROSE, or RESURRECTION PLANT. One of nature's most interesting phenomena is the "resurrection" of the dried branches of the Jericho rose when it is placed in water. This plant, after blooming, loses its leaves, and the branches curl up into a tight, dry ball. When placed in water, the branches again turn green and the pods open to discharge the seeds. This plant, which is a member of the mustard family and native to Arabia, is long-lived. It is now grown in many parts of the world.

JERSEY CITY, N.J. Lying across the Hudson from Lower Manhattan, Jersey City is joined to New York City by the famous twin-tube Holland Tunnel for automobiles, and by several rapid-transit tunnels for railroad and subway trains. Many ferries ply the Hudson between Jersey City and New York City, and the Pulaski Skyway connects Jersey City to Newark. Nine railroads serve the city. Five miles of busy wharves line its waterfront, offering excellent docking facilities for large ocean liners from all over the world.

The New York skyline, the Hudson River, and the harbor can be seen from the Heights, a fine residential section built on a bluff. Jersey City has many beautiful streets, including a boulevard 100 feet wide which parallels the Hudson for eighteen miles. The city has an excellent medical center. Jersey City also has three colleges, St. Peter's, New Jersey State Teachers, and John Marshall.

Principal manufactures include locomotives and railway supplies, steel, foundry and machine-shop products, chemicals, glass, zinc, jewelry, and rubber goods. Meat packing is an important industry. Jersey City provides a large share of the meat supplied to neighboring cities. There is considerable foreign and domestic trade in minerals and produce.

First settled by Dutch colonists in 1633, the town was incorporated as Paulus Hook in 1804, chartered as Jersey in 1820, and named Jersey City in 1838. It has the commission form of government. Population is about 272,000, second in New Jersey only to Newark.



ISRAEL'S HOLY WALL
The Wailing Wall in Jerusalem, for prayers.

JERU'SALEM. The world's most famous religious city, Jerusalem is filled with sacred and historical objects and sites of especial appeal to three great religions: the Hebrew, the Christian, and the Mohammedan. The Jews reverence it as the "mother city" of Jewry and as the center of one of the most glorious epochs in Hebrew history; to Christians, it is the city which is closely bound up with the life and death of Christ. To Moslems it was a holy city for many centuries.

Standing on two hills at the juncture of the valleys of Kedron and Hinnom, Jerusalem is located in Central Palestine, of which it was the capital while Palestine was a British mandate. Since the armistice with the Arab states in 1949 the eastern boundary of Israel has remained indefinite, and Jerusalem has been a divided city. The United Nations has proposed that the Holy City be internationalized. Israel proposed the internationalizing of the Holy Places.

History. Jerusalem has been the center of strife between various religious groups and races since its first known recorded history in the fifteenth century B. C. The city was originally under Egyptian rule, but in 1200 B. C., when the Hebrews began their conquest of Palestine, the country was controlled by the Canaanites, and the group known as the Jebusites occupied the city. Finally in 1048 B. C., David made Jerusalem the capital and center of Israel. From this time on, Jerusalem developed rapidly, reaching the height of its splendor during the reign of Solomon, who constructed the great temple on Mount Moriah. In 586 B. C. Nebuchadnezzar destroyed the city, fulfilling the prophecies of Jeremiah, and carried off the Jews to captivity in Babylon. About 536 B. C. the Jews were permitted by Cyrus the Great to return to the holy city and to rebuild the temple. The walls were not rebuilt until the time of Nehemiah, about 445 B. C.

The rise of Alexander the Great of Macedonia again saw the city pass into alien hands in 332 B. C.; next it was in the hands of the Ptolemies; then under Antiochus of Syria, who in 168 B. C. attempted to destroy the Hebrew religion. The Hebrew Maccabees successfully revolted three years later. The Roman conquest of the East soon put Jerusalem under imperial rule, where it remained for nearly 600 years. During that time it became the center of the Christian religion. A revolt of the Jews against Roman rule in A. D. 70 resulted in the bloody siege under Titus, who recaptured and completely razed the city. It was rebuilt during the reign of Hadrian in A. D. 130.

A long succession of Christian emperors on the Roman throne began a new "golden age" in the history of Jerusalem. This period was terminated by the conquest of the Mohammedans under Caliph Omar in 637. Jerusalem remained a Moslem city until 1099. At this time, European Christians, encouraged by the Pope, organized the Holy Crusades to drive the infidels from the Holy Land and return Jerusalem to the Christians. The city was taken in 1099, but in 1187 Saladin again regained it for the Moslems. The Ottoman Turks captured the city in 1517, and it remained in their possession until the end of World War I, when Palestine was made a mandate of Great Britain.

The conflict of the Jews and Arabs in Palestine became intensified after the First World War, because of the return of many Jews to Palestine (see ZIONIST MOVEMENT). There were new Zionist demonstrations in Jerusalem after World War II. Since Palestine became independent in 1948, Jerusalem has been the scene of sporadic armed clashes between Jews and Arabs. The Transjordan Arabs took possession of the Old City; at the same time the Israeli forces captured the New City, which was later made the capital of the new State of Israel. See PALESTINE.

The Old City. The Jerusalem of the Bible with its medieval walls became the administrative capital of western Jordan in 1953. The Old City has an area of about 210 acres and a population of about 100,000. The valley of Tyropoeon divides the city from north to south, forming two ridges. Jerusalem rises on a plateau of 2,500 feet between the Kidron valley on the east and the Hinnon on the west. There are eight entrances to the walled city with its winding streets and its huddled gray stone buildings. The Jaffa Gate stands on the west and the Damascus Gate on the northwest.

AGE-OLD JERUSALEM HAS ALL THE ORIENT'S FASCINATION

Truly a city of the East is Jerusalem; hallowed spot of three great faiths. Traders of all peoples still market their wares as they have done for centuries.

"BEHOLD, THERE CAME WISE MEN FROM THE EAST—"
Thus did the world rejoice at the humble birth of the Savior, Jesus.

is not certain, but was sometime between 4 B. C. and 8 B. C., according to our calendar. When the calendar for the Christian Era was adopted, it was intended to start with the year 1 as the date of Christ's birth. However, Dionysius, the monk who planned the new calendar, did not have the correct year of His birth according to the Roman calendar. Even now there is not agreement as to the Roman year.

According to the Bible story, He was born of the Virgin Mary and was of divine nature. Joseph, Mary's husband, acted as her protector and as the earthly father of the boy. Following His birth, Mary and Joseph remained in Bethlehem for some time, and on the fortieth day after His birth, Jesus was presented at the temple in a traditional ceremony. When Herod, the Roman ruler of Judea, heard of the birth of a king of the Jews, he decreed that all male children under three years of age should be killed, but Joseph was warned and fled with his family to Egypt.

Upon Herod's death they returned to Nazareth, where Jesus lived until He began His public ministry among the Galileans. Little is known of the early boyhood or young manhood of Christ, except for His appearance before the elders of the temple at the age of twelve. Most of the accounts of His life are confined to the period of His ministry on earth. His appearance among the people was heralded as the coming of the Kingdom of God in the prophecies of John the Baptist, who warned sinners to repent. Jesus was later baptized by John; then He retired into the wilderness, where He was tempted. After this, Jesus emerged and was acclaimed by John as the Son of God. Until the crucifixion, Jesus passed His life among the people, teaching His simple truths of goodness, brotherly love, and peace, and performing many miracles.

THE BEGINNING AND THE ENDING "AS IT IS WRITTEN"
The Bible's first mention of Jesus' religious feeling is the description of His discussion of philosophy at the age of twelve (top). Below, the crucifixion.

Albert Pounian, Metropolitan Museum of Art; Religious News Service

MARY MOURNING OVER THE BODY OF JESUS

These reverent figures, of painted terra cotta, are attributed to Giovanni Della Robbia.

The events immediately preceding the crucifixion opened with His triumphal entry into Jerusalem, on Sunday of Passion Week. The next two days He spent in preaching. Wednesday marked the betrayal by Judas, followed on the next day by the Last Supper. On Friday, after His arrest in the Garden of Gethsemane, Jesus was tried and condemned by the high priest, Caiaphas, and by the Sanhedrin, and was then taken before Pontius Pilate, the Roman ruler, who sentenced Him. See CHRISTIANITY (color picture, "Jesus Carrying the Cross").

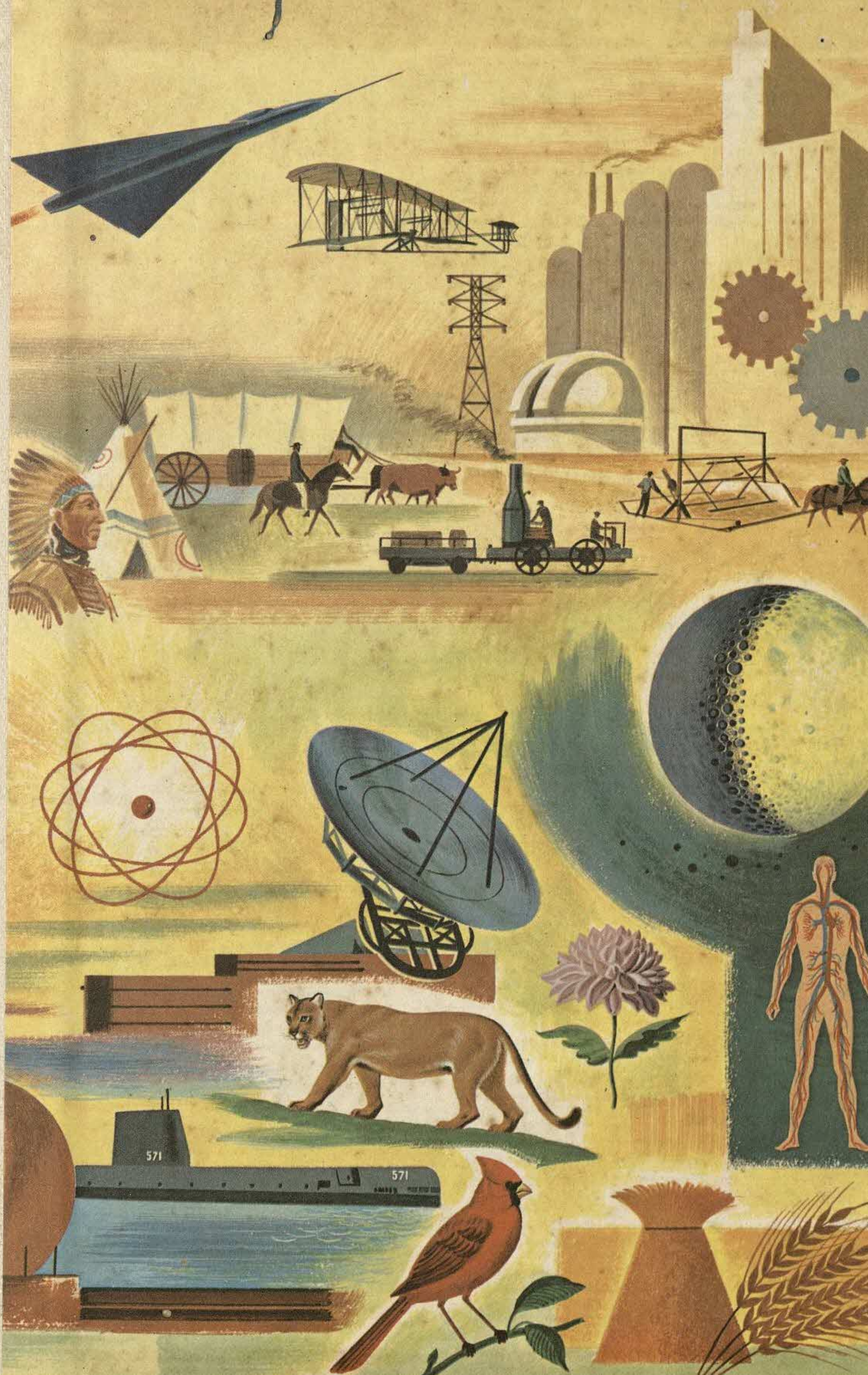
The crucifixion occurred on the same day. His body was placed by Nicodemus and Joseph of Arimathea in a crypt in a garden owned by Joseph. On the third day after His death, women, among whom was Mary Magdalene, came to prepare the body for burial and found the empty tomb.

Jesus remained on earth for forty days after His resurrection. During this time He appeared frequently to His disciples. On the fortieth day, He went up to the Mount of Olives and was taken up into heaven. See ART, RELIGIOUS; CHRISTIANITY.

RESURRECTION-POWER OVER DEATH

Christ rising from the tomb after crucifixion is shown in this painting by Borgognone.

E=mc²
EINSTEIN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